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LETTERS AND PAPERS

O N

Agriculture, Planting, &c.

ADDRESSED TO

The SOCIETY instituted at BATH,

FOR THE ENCOURAGEMENT OF

*Agriculture, Arts, Manufactures, and Commerce,*

Within the Counties of *Somerset, Wilts, Gloucester,* and  
*Dorset,* and the City and County of *Bristol.*

VOLUME II.

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OF

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The SOCIETY instituted at BATH,

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Within the Counties of Somerset, Wiltshire, and

Dorset, the City and County of Bath.

VOLUME II.

*Wm. Howells*

# LETTERS AND PAPERS

O N

Agriculture, Planting, &c.

SELECTED FROM

THE CORRESPONDENCE-BOOK

O F T H E

SOCIETY INSTITUTED AT BATH,

FOR THE ENCOURAGEMENT OF

AGRICULTURE,  
ARTS,

|| MANUFACTURES,  
And COMMERCE,

WITHIN THE COUNTIES OF

SOMERSET,  
WILTS,

|| GLOCESTER,  
And DORSET,

A N D T H E

City and County of BRISTOL.

*Plate missing facing page 356*

VOL. II.

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DIRECTIONS to the BINDER.

Place the Plate of the Norfolk Plough to face P. 356.

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*I N T R O D U C T I O N.*

**T**HE Preface to the first volume of these papers, and the subject matter of the whole, so fully express the nature and design of the institution of the Bath Society, as to preclude the necessity of saying much by way of Introduction. A few brief Remarks, however, may not be deemed impertinent.

A late ingenious Writer has justly remarked, that “ Improvements in Tillage  
“ arise, in general, from the slow operation  
“ of doubting experience among men who  
“ obtain their bread by the sweat of their  
“ brows, whose minds are not sufficiently  
“ enlarged to adopt, but with reluctance,  
“ any deviation from the practice of their  
“ forefathers, and who are fearful of risking  
“ the

“ the moderate certainty they possess for the  
 “ prospect of greater gains which are yet  
 “ unknown.”

The truth of this observation is evident; and shews the utility of Gentlemen's forming themselves into Societies, and offering premiums for the introduction of experiments, which will secure the practical Farmer from loss in case of their failure. And many Members of such Societies being men of considerable landed property, have a sufficient influence to propagate the resulting advantages in their respective neighbourhoods; and have it also in their power to make experiments, which it would perhaps be imprudent for common Farmers to make at their own risque.

Such Gentlemen, therefore, as patronize establishments of this kind, do themselves  
 greater



greater honour than their modesty will permit them to see in its full lustre; and are peculiarly intitled to the thanks of their country. At a very trifling expence they become the primary means of increasing the wealth and happiness of the community, who feel, through every rank and order, the beneficial effects of every improvement that tends to increase the value and the produce of our lands.

To the Beneficed Clergy also, of every rank, the encouragement of such Societies ought to become the object of speedy and general attention. They are essentially interested in whatever tends to promote the improvement and value of lands, being sure to partake of the increased produce, without the least loss from the failure of any experiment. It therefore seems incumbent on them to lend their assistance in supporting  
an

an institution which must increase the value of their livings in proportion as its exertions become beneficial to the public.

To their several correspondents, (whose letters are in general printed in their own words, and invariably so with regard to experiments) the Society return their thanks; and hope the following pages will furnish useful information to Practical Farmers.--- They also hope, by future communications from such Gentlemen as have made Agriculture and Planting their employment and study, to be enabled to continue their publication in a third volume.

L E T T E R S  
TO THE  
BATH AGRICULTURE SOCIETY.

---

ARTICLE I.

*Proposal for further Experiments on the Advantages of Cultivating Carrots.*

[By ARTHUR YOUNG, esq;]

GENTLEMEN,

THE publication of your first volume of memoirs has convinced the world, that you do not only labour with assiduity to perfect the Agriculture of the Counties to whose use your establishment is more particularly dedicated; but that you also embrace, in a liberal manner, the publick good of the whole community. A Society that does not publish it's transactions may be of a partial, limited, and confined utility, but can never diffuse the knowledge it rewards, nor render the successful efforts of individuals the

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B

means

means of general improvement. For want of this circumstance, the London Society (of which I have been for some years an attending member) has failed in a remarkable degree, of seeing it's noble and liberal premiums attended with any considerable effect. I am however happy enough to add, that they have entered upon that essential work at last, so that the world may hereafter expect to partake in that mass of valuable information which they have hitherto been too little solicitous to spread.

In your first volume are two memoirs on the cultivation of Carrots, an object which always appeared to me to rank among the most important in British Agriculture; but which, for certain reasons, has made much less progress than it's excellence would lead one to expect. The history of this branch of our husbandry is dispatched in a few words.

It appears from *Norden's Surveyors Dialogue*, published in 1600, that carrots were commonly cultivated, at that time, about Orford in Suffolk, and about Norwich in Norfolk; and it is very remarkable, that the tract of sand between Orford, Woodbridge, and Saxmundham, has, I apprehend,

hend, to this day, more carrots in it than all the rest of the kingdom put together; \*—a striking instance of the locality of practices in agriculture, and of that extreme tardiness with which any particular branch of cultivation moves from one place to another.

In the summer of 1779, I examined that country with a Russian gentleman, to whom I had the pleasure of explaining the admirable management of those sand farmers; and it was with much satisfaction that I found the culture of carrots rather increasing amongst them than the contrary, which I took the more notice of, as I had viewed it ten years before. One farmer had 36 acres, many of them from 10 to 20, few less than 5 or 6, and scarcely one that was without any. The strait, handsome, clean roots are sold at 6d. a bushel to London, and all the rest used upon the farm, chiefly for feeding the teams of horses, at an allowance of a bushel per horse per diem. These horses are of the finest cart breed, perhaps, in the world, do heavy work, and never have any oats allowed them when at carrots.

\* Perhaps the quantity of carrots raised in the neighbourhood of Chard, and brought to that market, may be nearly equal, and the roots superior in quality.

In the register of my *Eastern Tour*, I have given several accounts of the experiments on this root by sundry gentlemen, but most of them practised the husbandry in a desultory unconnected manner, instead of making them the part of a regular system. In countries where turnips are not well established, it is common to see a man have a few acres this year, and none the next;—a sure proof the culture is little understood. In the same journey I viewed the farm of Mr. Billing, who gained the premium of the London Society, for carrots, which he cultivated with great spirit for a few years, and then totally dropped them. Thus, gentlemen, we find that the culture of this valuable plant has made little or no progress, except in that angle of Suffolk, where it was established two hundred years ago.

In order to promote the husbandry in future, we must enquire into the circumstances that have hitherto retarded it.

I cannot attribute this to the expences of the crop, though they are high: Other articles of cultivation have spread greatly under expences double, treble, and quadruple those of carrots, such as hops: Besides, there are many gentlemen,  
not



not to mention substantial farmers, who would disregard the expence were they assured of the advantage. But the charge is not so great as generally thought, when managed with an eye to an extensive culture, and not a confined one for one or two particular objects. Let us compare them in this respect with turnips. Theoretical calculations are rarely so satisfactory as the actual transcripts of experience; I had this year a field of eleven acres, six of which were fallowed for turnips, three under the clustered potatoe, and two in carrots; the last have cost me per acre as follows:

		£.	s.	d.
Rent, tythe, and rates	—	1	7	0
One ploughing, (double the common price)		0	8	0
Seed, four pounds, at 1s. 6d.	—	0	6	0
Sowing	—	0	0	6
Harrowing	—	0	1	0
Three hoeings and one weeding	—	1	5	0
Digging up	—	0	10	0
		<hr/>		
		£.	3	17 6
		<hr/>		

When dug and left on the ground I consider them in the same state of preparation as turnips growing. I carted, cleaned, topped, and laid up part

of this crop, but those expences have nothing to do in the comparison with turnips. Before I proceed, allow me a few remarks.

Fifteen years ago I cultivated carrots upon another farm of this estate, but I was then so young a farmer that my expences ran much higher than these: I had a bailiff who had a great opinion of contract work; by his advice I hoed and took up by the acre. But experience has long since told me, that that mode of doing work is as extravagant in any unusual business, as it is beneficial in the common routine of a farm. At Woodbridge, hoeing carrots from general practice has as fixed a price as turnips, viz. a guinea an acre for three hoeings; but where the cultivation is unknown, day work I have found greatly preferable to contract. I should however observe, that if the summer had not been remarkably dry, my expence of hoeing might have been higher, for my soil, a gravelly, sandy loam, with stones, is much worse to hoe than the pure sands of Woodbridge: the chief difficulty arose from the quantity of the *Polygonum aviculare*, which was the predominant weed, so tough a one that scarcely any hoe will cut it. Your correspondent Mr. Billingsley reports expences which amaze me; 13s. an acre for sowing

sowing can scarcely answer; certainly with Mr. Duckett's drill it might be done for a third of that expence: Digging up 30s. an acre is equally extravagant. To return:—The turnips were twice sown, a part of them thrice, but were all eaten by the fly.†

I must therefore minute what would have been the expences had the crop succeeded. It is easy to do this with great accuracy.

		£.	s.	d.
Rent, tythe, and rates	————	1	7	0
Five ploughings, 4s. each	— — — —	1	0	0
Seven harrowings at different times	— — — —	0	4	0
Rolling with two horses	————	0	0	4
Seed and sowing	————	0	0	9
Hoeing first 4s. 6d. second 2s. 6d.	————	0	7	0
		<hr/>		
		£.	2	19
The expence of carrots	————	3	17	6
		<hr/>		
Excess,		£.	0	18
		<hr/>		
			5	

† As soon as I found the fly had begun to attack them I gathered elder in full blossom, laid it thickly in spots of the field; in some places the flowers matted, in others the leaves the same, and I added it fresh and fresh; but no attention of this sort would preserve me a single plant. The fly seemed to devour the plants as freely in those spots as in any other.

If we call the superiority of expence 20s. an acre, I believe we shall be very near the truth; and it must be at once apparent that the excess of 20s. in expence cannot be the cause of the culture spreading so little; for, to answer this expence, there are favourable circumstances which must not be forgotten.

I. They are much more impenetrable to frost. I never heard of any damage received by the crops at Woodbridge, where they are always left in the ground to be taken up as wanted. Last winter our crops of turnps were universally destroyed; and they suffer exceedingly whenever a frost is severe. This renders carrots so much more certain and to be depended on, that no man possessed of a good crop but must feel himself on velvet, while the stock of other men are starving.

II. They are not subject to any distempers, or accidents that approach to the evils of the anbury and the fly in turnips. They are also sown at a season when they cannot suffer by drought. Of late years turnips have suffered so much by all these attacks, as to have subjected the farmers of this county and Norfolk to most heavy losses.

III. They

III. They last to a season of difficulty, (April) when stock, and especially sheep farmers are so distressed, that they know not what resource to provide; a circumstance of superiority which every practical farmer must be ready enough to admit.

IV. But perhaps the greatest superiority of all is to be drawn from the nature of sandy soils, the principles which should guide their cultivation being in general most miserably misunderstood. On these soils there is an inherent defect in the culture of turnips as commonly carried on. The true theory of tillage for sand, is to give it *tenacity*; but unfortunately, the summer ploughings and harrowings so liberally given for turnips are in the spirit of the clay culture *friability*. Every ploughing that is given to sand, after the spring moisture is over, is certainly mischievous, in letting the sun deep into the soil, adding to it's looseness, volatilizing, and consequently carrying off any mucilaginous particles there may be in it, and letting loose that degree of adhesion which the preceding winter's rains might have occasioned. The farmers submit to these ills in order to effect the benefit of destroying weeds; and when a sandy field has much couch grass (*triticum repens*) in it, they are forced to repeat their tillage

to a degree that would make one believe they wished to destroy every principle of adhesion in the soil. Any husbandry, therefore, that would exclude all this tillage, and at the same time keep the weeds under, is evidently an improvement upon this system. Upon good sands there is scarcely a better practice than sowing winter vetches for soiling, and ploughing the land only once after the vetches for turnips; this excludes much tillage, but is inferior to carrots, which admit no summer ploughing whatever: One earth given with a trench plough in March, and ample hoeings on the surface through the summer, seems to be the management of all others the most proper for this soil; and if the crop is left late in the ground, and the soil is very sandy, to succeed it with buck wheat, for which any degree of cleaning from couch may be given if necessary. It must not from hence be imagined that I am an enemy to the Turnip Husbandry, which, in truth, is one of the greatest improvements that ever was introduced into the agriculture of this kingdom. I am no more than endeavouring to shew that there are advantages attending Carrots which do not flow from the other culture; and which render them an object of very great consequence, though not to be pursued to the exclusion of turnips.

When



When these circumstances are considered, it will not be found that the excess of the expence of the carrot culture can be esteemed any reason for their not having been more attended to in this kingdom. That excess in fact vanishes, for I am clearly of opinion, that there is no intelligent turnip farmer that would not give a considerable portion of it, if not the whole, annually per acre, on their turnips, to have them insured against all those failures and accidents to which carrots are not liable.

Now, if it is not to be attributed to the expence, that this cultivation does not extend, it will necessarily be asked, *to what is it owing?* My answer to this question will be, without hesitation, BECAUSE THE VALUE IS NOT ASCERTAINED. All other objections to a crop become as nothing when compared to this: For a man to attend with some degree of anxiety, much trouble, and great expence, to procure a produce, which when gained is of little or doubtful value, is to take pains to place one's self in an odious and grating situation. It is what no man will voluntarily do. The farmers put wheat, barley, or oats in the ground, because they know those crops will certainly repay them, if not a great, at least a moderate profit:

They

They sow turnips and clover, because a great mass of general and particular experience tells them that in the feeding of any sort of cattle those plants will amply pay them for any moderate expences. But if you recommend carrots, they at once say, *What are they worth? How will they pay?* The society that offers premiums for the cultivation, or the individual who recommends it, ought to be able to answer this question; and if they cannot do that, gain the necessary knowledge as the first step towards diffusing the practice.

The misfortune is, that the value remains yet unascertained; from a general review of the experiments before the publick, a satisfactory decisive knowledge of this point is not to be gained. As this is a circumstance of considerable importance, it will not be improper to give it a slight examination.

The most considerable practice, and the only one of common farmers, upon a large scale, is that of the sands in the neighbourhood of Woodbridge; unfortunately for ascertaining the value of the root from their crops, the sale to the London market always enters into their view in the cultivation. The strait, clean roots are sold at  
6d. per

6d. per bushel at the quays, upon the Woodbridge river, into ships that carry them to London; and the refuse of the crops are what they feed their horses with; all we therefore learn is, that it will answer to sell them at 6d. and that they are a nourishing and proper food for horses, instead of oats. But the sale is what we must keep clear of, for that is confined to certain situations within the reach of very great cities, as all the smaller towns are supplied by gardeners.

Amongst those whose experiments are published Mr. Billing ranks foremost; here again, the value of carrots is rather depreciated than advanced; for he raised great crops, had repeated experience upon a large scale of their excellence in fattening oxen and sheep; feeding cows, horses, and hogs; and keeping ewes and lambs in a very superior manner, late in the spring, after turnips were gone; but, notwithstanding these great advantages, he gave the culture up; so that when I viewed his farm there was not a carrot upon it; from which we may conclude a deficiency in value.

In several experiments I registered in my *Experimental Agriculture*, but which were not made with

with that precision which the importance of the subject merited, nor repeated often enough, I found the value upon an average, of all applications, to be 13d. a bushel, heaped measure; estimating it at 70lb. it is 1l. 14s. per ton.

In my *Eastern Tour*, the experiments of several gentlemen on carrots are inserted, and the following are their valuations:—

	<i>per ton.</i>		
	£.	s.	d.
Mr. Mellish of Blyth, a general valuation,	1	0	0
horses, cows, and hogs — —			
Mr. Stovin of Doncaster, hogs bought lean,	4	0	0
fatted and sold off — —			
Mr. Moody of Retford, oxen fatted, and the	1	0	0
account accurate — —			
Mr. Taylor of Bifrons, faving of hay and	1	0	0
corn in feeding horses — —			
Mr. Le Grand of Ash, fattening wethers	0	13	9
Sir John Hoby Mill of Bisham, fattening hogs	1	6	0

To these let me add Mr. Billingsley's experiment in your first volume, 200lb. 3s. or per ton 1l. 13s. 6d.

Now gentlemen, if we oppose to these accounts others of gentlemen, and I have met with such, who

who could not in some of these applications make their carrots worth any thing; it will appear how unsettled the real value is.

For instance: Mr. Stovin by fattening hogs makes 4l. per ton, and Sir John Mill 1l. 6s. but Mr. Edmund Burke, at Beconsfield, could not make his hogs fatten at all on them; and some neighbours of mine have found them fit only, as they express it, to *scour* hogs to death instead of fattening; yet Mr. Le Grand, of Ash, has sold three-score porkers, most delicately fatted (that is his term) upon them.

When accounts so extremely contradictory are before the publick, I am surely justified in asserting that the value of carrots remains yet unascertained. It is true, I am much inclined to give great credit to the accuracy, knowledge, and other circumstances, with which Mr. Moody appeared to me to deduce his valuation, which is also confirmed by several other respectable authorities; but still, as the experiments, upon which any of these gentlemen founded their valuations, were not often repeated, and under different circumstances, we must not consider the result as perfectly decisive.

No

No trial could be more completely conducted than Mr. Le Grand's upon wethers; but there are two circumstances which make it doubtful, whether his carrots had entirely fair play. The sheep appear to have been put lean to them; whereas, it is a fact well known, that if they are not half fat when put to turnips, no profit will result: *Quere*, if it is not nearly the same with carrots? He gave them also as much fine hay as they would eat; perhaps the sheep will not pay for this; the Norfolk practice with turnips is directly against it.

Upon the whole, we must consider the information before the publick rather as matter of encouragement to proceed, than that explicit proof which prudent and inquisitive cultivators will be apt to demand.

While this remains the case, the greatest service that can be done the publick in relation to carrots, is to form various experiments with the greatest accuracy, in order to ascertain their real value per ton. What an individual can do in this line is trifling, when compared with the decision that would result, gentlemen, from your taking it up with that spirit which seems to animate all your undertakings,

undertakings, and as you have a farm for the purpose of experiments, this would not be a difficult one to execute. But whether you attend by your officers to the conduct of such trials, whether you incite others by premiums to it, or whether any of your correspondents attempt it, permit me to observe, that there are one or two circumstances that should not be forgotten in the conduct of it.

I. If sheep are fattened, the carrots to be only dug up and left in the field, and the sheep to be immediately penned in herdles upon them; topping, cleaning, and packing up are expensive, perhaps more so than can be paid by sheep; and the land loses an ample manuring for barley, of which farmers know the great value in the case of turnips; the soil must however be *quite* dry. If dirt adheres, they must be carried to a grass field.

II. If oxen are fattened, the carrots to be laid up and given in stalls, with good hay in the racks.

III. Whether oxen or sheep are the stock, they should be half fat when put to carrots.

IV. Whether oxen, sheep, or hogs are fed, they should be weighed alive when they begin the



carrots, and also when fat; and the value should be taken when put up by the very best judges in the neighbourhood. The *price* bought or sold should not always be trusted to. Very good or very bad luck (as it is called) has such an influence in buying or selling, that extreme false conclusions are sometimes drawn, when so founded.

V. When given to horses, they should be considered as a substitute for oats, and the value so ascertained, and not the saving of hay, which was Mr. Billing's method, because they ought not to save any hay. The expence of washing not to be forgotten.†

If a series of experiments were made to ascertain the value of carrots in these various uses, and the result published, it would do more to establish the practice than any other measure whatever; a practice which I am convinced wants only to be well known in order to be generally pursued.

† Whoever would invent a cheap machine for washing carrots and potatoes in stagnant water would do a great public service; the London Society offered at my recommendation, in 1776, premiums for such a machine; and also in 1777, for ascertaining the value of carrots, potatoes, and parsnips, but without effect.

That

That no gentleman need be apprehensive of suffering, if he makes some experiments in order to ascertain this point, will appear from various considerations; it may not be improper to mention a few. I have shewn that they are to be cultivated for 4l. per acre, left on the ground for sheep. Suppose the crop only two bushels at 70lb. each per rod, three hundred and twenty per acre, or ten tons; it will readily be agreed such a produce is very low to calculate upon, since twenty tons are common among carrot cultivators. It appears from Mr. Le Grand's experiments, that a wether worth 2l. 5s. eats 16lb. of carrots per diem, and 4lb. of hay: Dropping the hay, and calculating for sheep of less than half that size, (which are much more common) it will be perhaps an ample allowance to assign them 12lb. of carrots a day. If they are (as they ought to be) half fat when put up, they will be completely fattened in one hundred days. At this rate twenty wethers will in one hundred days eat eleven tons, or very little more than one moderate acre.\* Now, gentlemen, let it be remembered that it is a good acre of turnips which will fatten eight such wethers, the common Norfolk calculation; from

\* The late very ingenious Mr. J. W. Baker, found that fat sheep of 20lb. a quarter would eat 20lb. of turnips per diem.

which it appears that one acre of carrots are in this use of more worth than two of turnips.

Further ; Let us suppose horses fed with them instead of oats ; to top, cart, and pack up ten tons of carrots, I know may be done for 20s. ; an acre is therefore 5l. Fifty pounds weight of carrots are an ample allowance for a horse a day ; ten tons at that rate last three horses one hundred and fifty days, or five months. But these five pounds laid out in oats at 16s. a quarter, will purchase little more than six quarters, which will last three horses at two bushels each per week no more than two months ; which is a most enormous inferiority to the carrots.

These estimates I do not offer as exactly correct ; I produce them only as hints to experimental farmers, to convince them that no just apprehension of loss can attend any trials on carrots, provided the soil is proper for them.

I beg, gentlemen, that you will pardon the imperfection of this slight sketch upon a subject, to exhaust which would demand a volume. If it proves the means of instigating others to give  
some

some attention to this very valuable article of cultivation, my aim will be fully answered.

I have the honour to be,

Gentlemen,

Your much obliged and devoted servant,

ARTHUR YOUNG.

*Bradfield-Hall, near Bury,*

*November, 1781.*

---

#### ARTICLE II.

*On the amazing Fertility of a Piece of Ground  
at Wantage, in Berkshire.*

*Wilton, January 1, 1783.*

SIR,

AS you were pleased to receive favourably some trifles which I formerly sent you, particularly an account of a very excellent sort of grafs, at Orcheston St. Mary in this county, which you thought proper to examine on the spot; I now trouble you with a few lines respecting a very fertile piece of arable.

Passing through Berkshire, a few months ago, I was informed of this ground by some gentlemen farmers. The account they gave me seemed so extraordinary, that I was induced to go several miles out of my way to see it. It is a close of two acres and a half by measure, situate at Wantage, and joins the turnpike road leading from thence to London. It belongs to Mr. Stirling, attorney at law; a gentleman whose principles and veracity stand high in the estimation of his neighbours. I had no introduction to him but my curiosity. He with much politeness and good nature gave me the following account. That, previous to his purchasing this field, twenty-six years ago, it was sown with barley five years successively. That he then planted it the first year with beans, and it produced twelve quarters; next with wheat, of which it produced fourteen quarters; and that he has sown it perpetually every year since, except one, when it was laid to clover; of which, it was computed, he mowed seven tons; after which he let the haygrafs for five guineas. Other years it has produced of boiling pease ten quarters; of barley twenty quarters; and of white oats twenty-five quarters: Their measure nine gallons to the bushel. Mr. Stirling says, that although this ground has been sown perpetually every year, except the one year above-mentioned,

it

it has never been manured more than once. It had then a thin dunging for wheat; which grew so rank that it was of little value. At all other times the produce has been very great. The wheat and beans generally grow to upwards of six feet high. Mr. Stirling has it ploughed and sowed by the neighbouring farmers, and seems not to have observed any particular mode of cultivation or course of cropping.

The soil is a blackish loam, from fourteen inches to three feet deep, on a stratum of sandy stone, which the country people compare to fuller's earth. This stone falls to pieces in the air; but does not crackle in the fire, dissolve in water, or effervesce with vinegar. Mr. Stirling made an experiment several years ago, of planting beeches in the soil alone, and others in the stratum alone without any soil, which last flourished much, and outgrew the other.

Whether this account may prove of any real utility, should it induce some curious speculatist to search nicely into the component parts of this fertile soil, you will best judge.

I am, your very humble servant,

BENJAMIN PRYCE.

Mr. Edmund Rack.



## ARTICLE III.

*Answer to Questions respecting Vegetation.*

SIR, *Manchester, June 21, 1782.*

I Shall esteem myself happy if any thing I have to submit to your consideration, in answer to your questions respecting vegetation, can afford you any satisfaction on that interesting subject.

*First*; Supposing the opinion to be true, which almost universally prevails, that arable land, after having borne a few crops, must remain some time *fallow* before it is fit to produce the same course of crops again: Whence proceeds the necessity of such fallowing?

*2dly*; Does the earth by the growth of vegetables lose any particles necessary for future vegetation?

I state these two questions together, because the consideration of the second seems properly to be previous to the first.

That the earth, by the growth of vegetables, is exhausted of those principles which are necessary  
to



to future vegetation, is abundantly manifest from the universal experience of mankind. All soils become weaker and poorer in proportion to the crops they have borne. This is not a matter of mere opinion, for the most fertile soils have and may be made unfertile by constant cropping, and the practice of all ages and countries fully evince the same: Therefore the true answer to this question is, that vegetables do take from the earth they grow in the particles necessary to vegetation, and consequently a temporary barrenness may be induced by over or a too long continued cropping.

But though it is certain, that rich or fertile land may be rendered unfertile or barren by extravagant and unreasonable cropping; it does not follow that fallowing is absolutely necessary to restore it's fertility, because the same end may be as effectually answered by other means. Fallowing may be necessary to clean the ground and destroy the weeds which sloth or bad husbandry may have occasioned, and which perhaps could not be easily extirpated by any other means; but it cannot be necessary to restore fertility, unless in such situations as proper manure cannot be obtained but at prices too exorbitant for the produce to repay with profit. Arable land may be  
so

so situated and circumstanced as to admit of no amendment from manures; as when they are far distant from towns, and destitute of marle, limestone, chalk, and every thing that is known from practice to renovate the fertility of exhausted and impoverished land. Here then the only resource is *fallowing*, and the necessity of it proceeds, first, from the principles or particles necessary to the growth of vegetables being exhausted by preceding crops; and secondly, by the want of manures necessary to restore and replenish the soil with those principles which the preceding crops had deprived it of and carried off.

Here indeed, a very interesting and important question may arise. How, or by what means can land lying fallow or unoccupied have those particles necessary to fertility restored? That fallowing has this beneficial effect cannot be denied, because all experience bears indisputable evidence to the truth of it. The effect is universally admitted, but the cause is the great *desideratum*. It must be observed, it is not mere rest that enriches and invigorates an exhausted soil. It's improvement, in general, will be in proportion to the *culture* bestowed upon it. This was fully evinced by the ingenious Mr. Tull, who clearly demonstrated by facts the great benefit of pulverization.

rization. But though his practice was right, as it certainly promoted the fertility of his land, the principles he drew from it were as certainly wrong. He maintained that pulverization increased the pasture of plants, and furnished their proper pabulum; and concluded earth in its most subtilized state was the true food of plants. In this he certainly erred. He mistook the means necessary to the acquisition of fertilizing particles, for the fertilizing particles themselves. Pulverization certainly increases the pasture, as the roots of plants easily pervade the earth in every direction, as its adhesion is diminished or destroyed, and as it renders the soil pervious to the fertilizing particles which are continually floating in the atmosphere. The atmosphere is the great repository, the grand magazine, which contains the fertilizing principles, and it is from that great and inexhaustible source that all the benefit of fallowing is derived. But pulverization is absolutely necessary to prepare the soil for the reception of those particles, for earth in it's natural compact state admits neither rain, snow, dew, nor any of those finer and more subtilized particles which are continually floating in the air, descend with them to the earth, and are carried off in the streams they form on the surface, together with such other particles as they take up and arrest in  
their

their way. So that rain, snow, dews, &c. which sink into, and are imbibed by a well-cultivated soil, and enrich the same, rather impoverish a compact soil, by carrying off those adventitious particles it may happen to have on it's surface, together with those that descend with them from the atmosphere. That is, land well cultivated and pulverized is constantly enriched and improved by the weather, while that which is neglected not only receives no benefit from the atmosphere, but is liable to have what little chance has bestowed upon it washed away by hasty showers and heavy rain, which cannot penetrate the obdurate surface.

The conclusion then is, *First*, That the earth is deprived of certain particles necessary to vegetation by the growth of plants; and to restore it's fertility, it is necessary that such particles should be restored. *Secondly*; Those particles may be restored either by the addition of proper manures, or, in situations where such manures cannot be had, by a due pulverization of the soil, and exposing it to the influence of the atmosphere, that is to say, by *fallowing*. *Thirdly*; That arable land after having borne a few crops need not remain sometime fallow before it can produce the same crops again, unless in circumstances where manure

nure is not to be got; for whenever the earth can be replenished with such fertilizing particles without fallowing, in that case fallowing is evidently unnecessary.

*Question 3d.* What are those particles that are necessary to vegetation?

The purport of this question I understand to be, of what nature or constitution are those particles which enter into the essence of plants, assimilate with it, and increase their bulk; or, in other words, which feed and support plants in every stage of their growth, from their first embryo state to that of maturity, or highest state of perfection?

For a rational solution to this question we must have recourse to experience. Indeed no certain conclusion can be drawn in the extensive field of agriculture, from data furnished by any other means. All theories and hypotheses, whose principles originate in the imagination, are as visionary, delusive, and untenable as aerial castles, whose foundations are in the clouds. A man may think ingeniously, but he will rarely think rightly, when he quits the sure guide of experience

rience to pursue the flights of a glowing fancy, which has no connection with or relation to the established laws of nature.

The daily practice of every husbandman clearly shews, that those fertilizing particles, of whatever they consist, are to be found in every article of the vegetable and animal kingdom, that is capable of fermentation, and dissolution by putrification. The dung-heap, which is a promiscuous combination of these substances, when in the highest state of putrescence, is perhaps the strongest and most efficacious of any general manure. Were this to be had in quantities equal to the farmer's wishes, at a moderate price, his fields might be always fertile, as it would be a fund sufficient to restore those principles of vegetation which the most exhausting crops could annually take from the soil. It is a matter perfectly uninteresting to the practical farmer, by what name the philosophical chymist may call those fertilizing principles. They may be oils, salt, sulphur, water, earth, some or all combined together. The knowledge of this is of no importance to him. He is a stranger indeed to chymical analyzation, but he is perfectly acquainted with the gross substance, in which those particles so necessary to restore



restore fertility to his exhausted fields are to be found; and experience has taught him the best season, and most beneficial method, of applying them for the benefit of his crops. Could the farmer procure a sufficient quantity of this manure, a fallow to restore the particles necessary to vegetation would be unnecessary; the land might be replenished as fast as the most exhausting crops could weaken it, and in this way the land, instead of being impoverished would be improved, and the longer it was kept in culture the richer and better it would grow, as is evidently the case of all land that is cropped and cultivated with discretion.

This may be called the natural means of providing the pabulum or food of plants, as properly as giving grafs to a cow, or hay to a horse. But there are other means of improving of soils, which communicate none of these particles which are necessary to the support and growth of plants. This is done by means purely mechanical, by rendering some soils more susceptible of those fertilizing particles which float in the atmosphere, and others more capable of retaining them during the stage of the growth of plants in them than they were in their natural state. Thus a very strong adhesive soil, which in it's natural state may be too compact for most sorts of vegetables to thrive



thrive in, by the proper admixture of gravel or sand, its staple may be so shortened and opened as to favour the admission of atmospherical particles, and to encourage the extension of the roots and tender fibres of the plants that may grow in them. And a soil which consists chiefly of gravel or sand may, by a proper addition of clay, chalk, marle, or any binding earth, be made capable of retaining those particles necessary to vegetation, which would otherwise pass through them like sand through a sieve, and consequently would be bestowed on them in vain.

Lime, I apprehend, considered as a manure, is *chiefly* to be regarded for it's mechanical properties; for neither in it's quick or effete state doth it contain any of those nutritive particles necessary to the growth and increase of bulk in plants. Indeed, when judiciously used, it may as an alkali serve to unite and combine the oils it may happen to meet with in the soil with aqueous or humid particles, for it strongly attracts both, and forms a kind of saponaceous mixture highly replete with fertilizing particles. But the various methods used in manuring with lime plainly shew the farmers in general act upon no certain or fixed principle, but conduct their practice by the custom

tom and usage of the country, without being able to assign any reasonable ground for their expectations of a crop, otherwise than a settled belief that their land would be unproductive without it ; while others are free to declare, that they could never perceive that they derived the least advantage from it.

Lime in some states, and under some circumstances, is so very different a thing from lime in other states, and under other circumstances, that unless its condition be pretty accurately described, it is scarcely possible to treat intelligibly about it. There are scarce any two bodies which differ more in their properties, than the properties of quick lime do from those of effete lime ; therefore, to assert any thing of the virtue of lime, either as a medicine or a manure, without describing its state and condition, and the circumstances of using it, is to say nothing that is intelligible, or that can convey the least beneficial information. The subject, however, is worthy of the most thorough investigation, tho' it appears to have been very little attended to by the practical farmer or philosophical experimenter. With some it is the *sine qua non* of successful practice ; with others, a certain heavy

expencc attended with no kind of advantage. Where its greatest effects are said to have been experienced, I believe it is more owing to a fortunate concurrence of circumstances than to the skill of the husbandman, acting upon principles deduced from the reason and nature of the thing. However, as in many counties it is the farmer's chief, almost only dependence, and attended with a heavy expence, it is surely of great moment, that its principles of acting should be better understood, and its virtue more satisfactorily ascertained; which, if leisure permits, may be attempted in some future paper.

If you think these remarks worthy of the notice of your respectable society, I beg you will present them with my respectful compliments.

I am, Sir,

With much respect and esteem,

Your most humble servant,

JOSEPH WIMPEY.

Mr. Edmund Rack.

## ARTICLE IV.

*A Supplement to the Answer sent to the Secretary of the Bath Society, respecting Vegetation, &c.*

*And read before the Literary and Philosophical Society of Manchester, the 3d of July 1782, by JOSEPH WIMPEY.*

AS truth and usefulness are the ultimate objects of philosophical enquiry, the writer of the answer presumes to hope, the candid society will indulge him with an opportunity of endeavouring to obviate the objections made to it, that appear to him to be groundless.

*Question.* “ If arable land, after having borne  
“ a few crops, must remain sometime *fallow* be-  
“ fore it is fit to produce the same course of  
“ crops again; whence proceeds the necessity of  
“ such fallowing? Does the earth, by the growth  
“ of vegetables, lose any particles necessary for  
“ future vegetation, &c.”

To this it was answered :—“ That the earth, by  
“ the growth of vegetables, does lose certain par-  
“ ticles necessary for future vegetation, is a fact  
“ well known to every practical husbandman ;

“ for there is no land, though it may be ever so  
 “ fertile, but by constant cropping may be ex-  
 “ hausted, and reduced to a state of barrenness.  
 “ But it does not follow, that fallowing is *absol-*  
 “ *utely* necessary to restore its fertility, because  
 “ where a sufficient quantity of manure can be  
 “ obtained, its fertility may be restored without  
 “ fallowing. And on this scale of management,  
 “ the longer land may be under cultivation, it  
 “ would be so far from being impoverished by it,  
 “ that it would be in a constant state of progressive  
 “ improvement.” To this it was objected, by a  
 very respectable and ingenious member present,  
 (the Rev. Mr. Hall) that the opinion was not  
 well founded, for he had known instances wherein  
 fertility could not be restored by manure, and  
 mentioned some garden or gardens within his  
 own knowledge. To this the writer replies, the  
 objection supposes what the position does not  
 assert or maintain. Had it been asserted, that  
 the fertility of land increaseth in proportion  
 to the quantity of manure laid upon it, the ob-  
 jection might have been good; but he knows  
 little of vegetation, or of the improvement of  
 land, who knows not that it may be rendered  
 unfertile, at least for a time, by laying too large  
 a quantity of dung upon it; and perhaps, of the  
 two evils, a surfeit may be more pernicious than  
 a fast.

a fast. Should it be asserted, that animal food and vinous liquors give nourishment and strength to human bodies, the objection would be deemed frivolous, which should assert that instances frequently happen of their causing sickness and surfeits, and becoming loathsome to the stomach. This would be no argument against the truth of the position, but a very just one, that the best things may be abused, and their value destroyed by a preposterous use of them.

A gentleman's gardener keeps no account of profit and loss for his master. His interest often depends upon the goodness of his crops, and his credit always upon the magnitude and beauty of his fruit, &c. but it is no object with him, whether a cucumber, or a pound of potatoes, stand his master in five farthings or five shillings; or whether a melon, or a pine apple, cost him a penny or a pound. His ambition is to excel. The pleasure of making computations, and the advantages attending them, he sagaciously leaves to those whom it may more nearly concern. However, should we enquire into the foundation and support of his art, it would appear, his principal dependence is upon manure, for till his soil is rendered fertile, his art and his labour would



be fruitless and vain. Surely it is no argument, that proper manure will not restore fertility to an exhausted and debilitated soil, because it will not produce similar effects in those which have been already drenched and surfeited with too much. A gardener is generally profuse in the use of dung, as long as he finds it will force his crops; but the time will come, when by this means, the soil will become so rich, light, and porous, that it would bear nothing but a mushroom or a fungous, a pompion, or a gourd.

The products of nature and of art have each their *ne plus ultra*, and the efforts of the latter are universally circumscribed by the former; and perhaps there is no article in either, which under different circumstances, as quantity may be proportioned, may not be a medicine or a poison. And this, it is presumed, will ever hold true both in the animal and vegetable kingdoms.

Every one knows the upper stratum of mold, which is found on the surface of all fertile soils, is that in which fertility chiefly resides, and it is equally certain, that the more constantly land is under cultivation, this upper stratum will be proportionably increased by the more frequent addition



tion of manure, and the roots and stems of the plants that grow in it and upon the same; and therefore, as was said, constant culture improves and not impoverishes land, as its fertility is generally, perhaps it may with truth be said always, in proportion to the depth of this adventitious stratum; for it is by no means an original or primitive earth, but a combination of vegetable and animal matter, or of one of them separately, produced by putrification and dissolution, which being by culture intimately blended with the original soil, perhaps sand, or gravel, &c. of themselves barren, a fertile soil is at length procured with increasing powers, as cultivation is multiplied and extended.

The practice of the kitchen gardeners, near the metropolis, and in the vicinity of most market towns, will at once illustrate and confirm the doctrine here advanced. They frequently raise three or four crops annually on the same ground, and support such an extraordinary exhaustion solely by culture and manure. The rent of their land is too high to admit of fallowing, and the goodness of their crops plainly shew it does not stand in need of it. Labour and dung answer every purpose. And I have been informed,

much of their land, which was not worth more than 20s. an acre twelve or fourteen years ago, is now worth, at least, half so many pounds:—So much has it been improved by the culture and manure bestowed upon it, without the least advantage from fallowing.

As to the elective property of plants, mentioned by one of the members, how much so ever its theory may have been supported by men of learning and ingenuity, it has been long reprobated as visionary and chimerical by practical husbandmen, it being repugnant to, and contradicted by daily experience. Let a fertile soil continue to be planted with any one kind of grain whatever, 'till its strength be exhausted, and no longer capable of bearing that particular grain, it will be found equally incapable of producing a crop of any other kind which requires an equal degree of sustenance. Should a fertile field be sown first with wheat, then with barley, then with oats, and then with rye, it would be found, such field would bear neither turnips nor clover 'till its fertility was restored, either by manure or by fallowing. And should it be planted with wheat or barley *only*, several years in succession, 'till its strength was exhausted, it would be equally incapable

pable of bearing any other sort of grain, roots, or grasses, as if it had borne each in succession according to the usual course of cropping; which shews that the fertility of land may be as completely exhausted by any one plant as by them all, which could not possibly happen, if the particles of nourishment each drew were only proper to each, and could not be absorbed by any other. It is true, some kinds of plants exhaust and impoverish the soil much faster than others; as perhaps, three crops of wheat would impoverish the land it grew on, as much, or more than four of barley; but yet, if planted with either 'till it would bear it no longer, it would be found equally incompetent to the growth of every other kind of plant, excepting such unprofitable ones as are the natural produce of sterile soils. The true conclusion therefore is, if land be exhausted, whether by the growth of one particular kind of plant, or of many kinds in succession, its fertility must be restored before it can bear a profitable crop of any other kind of vegetable, though it had not been planted with it for an age before.

The question ends with asking, "Does the  
 "earth attract any thing inimical to vegetation?  
 "And if so, what is it?"

That

That some earths may be more favourable to vegetation than other, and that some may be impregnated with steely or other poisonous matter that may be inimical to vegetation, is very easy to conceive; but that a soil in itself fertile, should attract any thing from the plants that grow in it, that is inimical to future vegetation, I cannot conceive. It is true, a very learned and ingenious member (Dr. Percival) seemed to doubt, if I understood him right, whether the earth might not attract something from the plants growing in it that might be prejudicial to it; for, said he, reasoning by analogy, why is it not probable, that vegetables in this respect may suffer like animals? For my own part, I must acknowledge, I do not know that either one or the other are subject to any thing, during the different stages of their growth, that militates with or is inimical to their own well being. Nor can I conceive what the observation means, unless it be, that the respiration and perspiration of animal bodies, when collected in a confined or very close place, where little or no fresh air can gain admittance, form a putrid atmosphere too noxious and deadly for animals to subsist in. In this sense, indeed, vegetables may suffer equally; for fresh air is as necessary to support vegetable as animal life, one being as incapable of subsisting without it as the other.

other. But these evils result from accidental circumstances, and not from any fixed law of nature, the wisest provision having been made for clearing the air of noxious effluvia, and supplying it universally with necessary vivifying principles. According to some late discoveries in natural philosophy, the œconomy of nature, in this respect, is transcendently beautiful and astonishing; for these excrementitious vapours that would soon render the air putrid and poisonous, are quickly absorbed by the vegetable kingdom, and the air purified and made fit for respiration. The animal and vegetable kingdoms seem to be the mutual support of each other, with this difference only; the latter is absolutely necessary to the support of the former, but the former not to the latter, it having a resource within itself and can subsist without it, though evidently not to equal advantage. Thus vegetables are the immediate food of those animals which entirely subsist upon them, and mediately of the carnivorous race by the support of those they live upon. But though the vegetable kingdom is in a great measure sustained by the animal, I mean those raised on lands in high cultivation, yet for the most part they might be sustained by feeding on their own stock; for vegetables, thoroughly  
reduced

reduced by putrefaction and dissolution, become the proper pabulum and support of a new generation of vegetables, but this is by no means the case in respect to animals.

Analogy, here then, seems to afford no foundation for the opinion, that the earth may attract something from the present growth of vegetables inimical to the growth of those which may succeed them. Indeed the supposition involves a contradiction, for it is within the compass of every one's knowledge, that land is frequently planted with some kinds of vegetables to be ploughed in by way of manure to promote the growth and secure a profitable crop of others. Thus buck-wheat, rye, clover, and sometimes the green of turnips, &c. are ploughed in to manure and prepare the land for wheat, and perhaps, in many cases and situations, it is the cheapest and most profitable of all manures whatever; but if, as the supposition states, the earth during the growth of the present, contracts any disorder that may prove inimical to the succeeding crop, the practice could not produce the expected benefit, but must prove universally detrimental, which is contrary to all experience.

The



The plain truth then seems to be this:—All fertile soils contain particles necessary to the growth of vegetables.—All vegetables in their growth necessarily take from the earth as many of those particles as are useful to their growth and support; by which means the most fertile soil will in time become poor, that is to say, when it is exhausted, or nearly exhausted of such necessary particles. But these necessary particles may be supplied, and fertility restored, by the growth of more vegetables, provided the crop is not taken off from the land it grew on, but suffered to remain upon it, or rather at a proper stage of its growth ploughed into it. This clearly proves then, that the earth does not *attract any thing inimical* to vegetation during the growth of plants, but that it is truly enriched and improved by their growth, if they are suffered to remain there. After all, an inquisitive mind may find something very surprizing in an enquiry concerning the nourishment and growth of vegetables, and perhaps much more so in respect to animals.

Every one knows, that all richly cultivated lands, whether fields or gardens, are made fertile by manure; and that the richest of all manures are those substances, whether animal or vegetable,



able, which have passed through the bodies of animals. The excrements of animals then are the richest and most nourishing food of vegetables; therefore it is very reasonable to suppose, and experience confirms it, that they attract them copiously in their subtilized state as they float in the air. But is it not truly astonishing, that materials, the most offensive and disgusting one can conceive, should, by the wonderful chymistry of nature, be converted into plants, leaves, and flowers, most curiously beautiful, which charm, delight, and ravish the taste, the sight, and the smell.

Should we carry our speculations a little further, our astonishment would be greatly increased. Of what does the nourishment of man consist? From what source are his most favourite viands derived? Is it not easy to conceive, or rather, is it possible not to perceive, that a few months before they might exist under a form, and in circumstances the most loathsome and offensive. Excrements the most gross and detested may soon assume the pleasing verdure of a richly enamelled field, be devoured by the bleating flock, and conveyed a second, yea, a tenth time into the same stomach and bowels in the form and substance

stance of the flesh of an innocent lamb. What a mortifying consideration this to the pride of a prince, who can never be certain that the last meal he made was not, and the next will not be on the excrements of a beggar; or, what is still infinitely worse and more disgusting, on the putrid remains of a polluted nymph, who made her last groans in the horrid mansions of the Lock!

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## ARTICLE V.

*Cavendish-Square, April 6, 1782.*

Mr. RACK,

ON my shewing you Mr. Anderdon's answers to some queries I had put to him, you expressed a desire to have them, that they might be inserted in the next volume published by the society; I wrote to him for his approbation of your proposal, and have inclosed you his answer, and I make no doubt but you will comply with the terms\* he requires; I have sent you a fair copy of them for that purpose.

\* These terms were, that Mr. Anderdon should have the revision of his answers previous to their publication, which have been complied with.

I have

I have introduced the Norfolk plough, with great success, into our part of Wiltshire, making some small alterations therein; so that I now only use two horses where I formerly used four; it will soon become universal amongst us.

I am, your's sincerely,

W. L. JONES.

*QUERIES proposed by Sir William Langham Jones, Bart. to Robert Proctor Anderdon, Esq; with Mr. Anderdon's Answers.*

1<sup>st</sup>. **A**T how much an acre does the adjacent land of the same quality let?

2<sup>dly</sup>. Are the stones much, or any, impediment to the success of the experiments?

3<sup>dly</sup>. Does Mr. Anderdon think that the same advantages might be expected from the horse-hoeing husbandry when tried on flinty ground, as from his stoney land?

4<sup>thly</sup>.

4<sup>thly</sup>. At what distance are his rows of wheat, and also the plants in each row?

5<sup>thly</sup>. Is the same row planted every second or every third year?

6<sup>thly</sup>. Does he manure the ground? If so, how often, and what is the manure he uses; and how often in the year is the fallow ploughed?

7<sup>thly</sup>. How many years has the wheat-field been under this course of husbandry?

8<sup>thly</sup>. Does the said field become more fertile according to Mr. Tull's principles, though no manure is put upon it; or does Mr. Anderdon think that it is worsted by such a mode of cropping it?

9<sup>thly</sup>. What may be the produce of an acre thus tilled? And how much more does he think it would produce, if cropped according to the common mode of husbandry?

10<sup>thly</sup>. If he thinks the berry [kernel] better and heavier, and so liable to smut or blight, as if the land were tilled in the usual manner?

11<sup>thly</sup>. Whether, on the whole, he has reason to prefer this new to the old mode of husbandry ; and whether he thinks any considerable tracts of land could be managed upon the principles of the new husbandry ?

12<sup>thly</sup>. With respect to Mr. Anderdon's experiments on grasses, Which does he think will be the best to feed sheep with ; and how many more will an acre of such grass maintain, than it would if in meadow and cut, and given to them to eat ?

13<sup>thly</sup>. What grass does he think best for cows, and what for horses ? And whether on the whole, considering the difference of the expence, it is an object to turn good meadow or pasture ground into such a mode of cultivation ?

14<sup>thly</sup>. Whose ploughs, &c. does Mr. Anderdon use ; and what authors does he recommend to any desirous to try the horse-hoeing and drill husbandry ?

### A N S W E R S.

1<sup>st</sup>. From five shillings to twelve shillings per acre.

2<sup>dly</sup>.

2dly. The stones in Mr. Anderdon's lands are calcarious ; and he has an idea, (but must leave it to chymists and philosophers to decide upon the fact) that their effervescence, on the change of weather, contributes to the fermentation necessary to vegetation.

3dly. Mr. A. has had no experience himself on flinty land ; but unless the stones are so large as to obstruct the operation of the plough and horse-hoe, he thinks such lands well adapted to the horse-hoeing husbandry, the loose stones, at least, assisting to keep them in a more constantly ploughable state, (which is absolutely necessary to succeed in that mode) and most probably also assisting vegetation, in the manner supposed from the lime stone, or otherwise.

4thly. He drills two rows, a foot asunder, on a ridge five feet wide, of course leaving intervals of four feet for horse-hoeing. The seed is shed in the rows promiscuously, but regularly, by Willy's drill-plough, at the rate of from two pecks to a bushel per acre ; and he is of opinion, the medium between the two is preferable to either extreme, if the land is well tilled, and the seed sown in proper season, having due time for the plants to tiller.

*5thly.* The wheat is drilled on the same ground every second year, and Mr. A. continued that mode to advantage eleven successive years, in the ground above alluded to; his tenth crop producing eighteen bushels an acre, and his eleventh crop sixteen bushels per acre, after great devastation from mice, the crop remaining in the mow almost two years.

*6thly.* He manured the ground for the first crop with twelve hogsheds of lime per acre, and eight putt or cart loads, of this country, of rotten dung, to three quarters of an acre, at the expence of 20s. 4d. per acre. For the sixth crop he manured again with twenty hogsheds of lime an acre, mixt with forehead-earth\* and the rubbish of an old lime kiln, at the expence of 1l. 19s. an acre: And he used no other manure for eleven crops, sowing about twenty loads of earth and rubbish at another time, on a small portion of the field, where the natural soil was remarkably thin, which, if charged to the whole field, would not be 2s. per acre at the utmost; the whole expence of manure for the eleven years amounting to nearly 5s. 7d. per acre per annum.

Mr. A. has sometimes ploughed or horsehoed his alleys only twice during the growth of

\* Head-lands digg'd up.



his crop, but it should be repeated three or four times at least; the earth cannot be kept in too friable a state; when the crop is in early enough, and the weather will permit, (as this year 1781) he has ploughed or horse-hoed before Christmas; then he ploughs again as early as he can in the spring; a third time when the ear begins to swell in the stem; and a fourth time immediately before the blossom is come out, or as soon as it is gone: And these four ploughings, or horse-hoeings, he thinks absolutely necessary to do justice to that mode of husbandry, yet is sorry to say, to his loss, he has seldom fully complied with them.

*7thly.* Eleven years, as above; the last crop was reaped in autumn 1779.

*8thly.* Mr. A. finds his ground, with the manure as above-mentioned, greatly improved, and is of opinion, that after the above mode of cropping for eleven years, had he carried no manure on the ground, it would have been rendered more fertile than at the beginning; but he does not think he should, in such a case, have had crops as profitable as with manure; yet he thinks it absolutely necessary to avoid manuring super-

bundantly for wheat crops, lest they should run to straw, and thereby become unprofitable.

*9thly.* The crops have been from nineteen bushels to nine per acre; the average of the eleven crops fourteen bushels per acre per annum. The crops of wheat in the same parish, take the good ground with the bad, (and some runs to a pound an acre) for the eleven years in question, Mr. A. has been well informed, were on an average not more than fifteen bushels an acre. It should be observed, by the drill mode, you have the advantage of saving a bushel or more of seed per acre, as well as of having a wheat crop every year, and keeping your ground clean and in good heart.

N. B. When the crop was only nine bushels an acre, it happened from steeping the seed, according to Reynolds's method, which was overdone, by which means two bushels were increased to three, and a very wet season following, the seed was in great part burst and destroyed.

*10thly.* The berry or grain is certainly larger, fuller, and more perfect, consequently heavier in every sense.\*

\* This perfectly agrees with the accounts from Norfolk of the wheat crops that have been *set* in that county.

As

As the smut has not affected Mr. Anderdon's crops, and attacks chiefly weak corn; and as you may in this mode of Husbandry sow soon after harvest, and horse-hoe almost at pleasure; he thinks it most likely to contribute to its prevention, removal, or cure. Change of seed, and brining it, are also recommended to prevent it.

For the blight, as there are several sorts, arising for the most part from poverty, all such Mr. A. supposes the horse-hoe might remedy; but as to that species which arises from plenitude, he supposes this husbandry must be, in a degree, liable to, as well as the old; yet he thinks frequent horse-hoeings, as they retard the immediate growth and hastily running up of the plant, would in the progress, if repeated with judgment, strengthen the stem, and abate, if not prevent, that weakening and falling of it, which might otherwise occur from repletion and hasty growth.

His corn has been slightly attacked by the rust or mildew, but never yet so powerfully as his neighbours in general at the same time.

*11thly.* Mr. A. thinks the drill-plough, judiciously used, a very great acquisition to agriculture.

He is of opinion, from experience, that the use of it is the best method, not only for putting in wheat seed in the horse hoeing or Tullian method, but also when the whole field is seeded with that grain, sowing it in such case in equidistant rows, nine or ten inches or a foot asunder. In that way, it is best too, for seeding ground with barley, oats, or vetches. The seed will be less, the crops more certain and larger. It is also best for putting in turnip seed, and horse (or tick) beans, both of which he would recommend to be sown in single rows, three feet asunder, horse-hoeing the intervals; pease may be better supported in double rows, a foot asunder, on five feet ridges.

Succeffive horse-hoed crops of wheat are profitable, but he is rather inclined to think the horse-hoeing husbandry would be most profitably carried on by a change of crops; and that turnips on a good fallow, drilled in single rows, three feet asunder or more, 'till the ground is in perfect tilth, would be a good crop to begin with; and if dung or other manures can be had, they can scarcely, for that crop, be too plentifully applied; but, on reclaiming large extents of land, must in great measure be dispensed with.

Then

Then should follow such drilled crops as best suit the soil and situation, and the farmer's occasions, whether according to the Tullian mode, or in equidistant rows; and should it be barley or oats, in the latter way, it will be remarkably favourable to the grass feeds, if any sown with them. But a great respect and consideration ought always to be had in favour of the Tullian mode, from the vast advantage arising from the ground being clean of weeds, which advances in proportion to the length of time the ground has been well managed under that mode, and not been made foul by carrying into it the seeds of weeds with dung or other manure: Therefore, Mr. A. strongly recommends it to the farmer, whose ground is well adapted to wheat crops, to introduce them in the course of crops in the Tullian mode, and to take two, three, or four successive crops, which may as well be taken as one.

Mr. A. is of opinion, there are in England millions of acres of land uncultivated, and badly cultivated, that would admit of being greatly improved upon the principles of the New Husbandry, not too hastily or inconsiderately exercised. It always, in the first place, requires a fallow and perfect tilth; if very foul and rough,  
it

it should have two years fallow before it is cropped; and if very poor, will require and pay amply for some manure, if attainable. But the plough and manure may often be too much for corn crops; and it is absolutely necessary to suit your crops to the nature of your soil, and the state it is in. He imputes the small progress the drill-plough has made in agriculture to the want of attention to those particulars, arising chiefly from the adventurer's being too sanguine and hasty to execute his new project, and actually doing it before his ground is in order; of course the crop fails, and the drill-plough is no more heard of.

*12thly.* Mr. A. is not acquainted with any grass fit to cut and give to sheep in preference to their feeding on the ground allotted out to them in parcels by hurdles, where convenient or necessary; for which purpose he knows no artificial grass superior to meadow. If lucerne or sainfoin were cut and carried to them, they would eat the leaves and not the stem. But Mr. A. thinks Burnet so healthy a grass for sheep, that he earnestly recommends it to all farmers to intersperse some of it in every field sown with grass seeds, to remain in pasture; for he conceives it



to be warm and astringent, having put sheep that have scoured into such of his fields as abound with it, by which they have soon been visibly benefited. At the same time Mr. A. as earnestly dissuades farmers from sowing it alone, (unless to save the seed) because he never found any cattle fond of it alone; but it passes very well in common with other grasses.

*13thly.* For horses, cows, and all black cattle, to be cut and carried to them to eat, he thinks Lucerne preferable to any other grass; and that an acre of it in good ground, where it thrives well, will, from early in May to Michaelmas, maintain twice the number of cattle that an acre of good meadow will. But the lucerne field is, in effect, a stubble from October to May. Next to lucerne, for the above purpose, comes Sainfoin or French-grass, but its produce in the summer is but little more than half as much as that of the lucerne; yet you may winter-feed the sainfoin with sheep 'till Christmas, and with other cattle 'till Candlemas; but if you stock it later in the spring, you destroy your crop, the cattle eating the crown of the root and killing the plant. But for the cultivation of these, or any other grasses, by way of raising fodder for cattle, (or for any  
other



other purposes) Mr. A. has not an idea it would answer to destroy good meadow, or very good pasture, which, from Candlemas to May, (the scarcest time of the year) is the most valuable of all, and ought to be held in the highest estimation.\*

*14thly.* He uses the patent plough for general ploughing, and often in the intervals of his drilled crops, but more frequently there lesser ploughs, nearly on the same principle, sometimes with, sometimes without a mould board, according to the state of the ground and the crop; the Kentish shin; sometimes Hewitt's horse-hoe; at others a kind of double cultivator or zull, with mould boards extendible at pleasure; small harrows for the intervals or alleys; Willey's horse drill-plough, which he has used fifteen or sixteen years, without the expence of so many shillings to keep it in order. He also uses a spiky roller to reduce his heavy clay lands, when perfectly dry only.

As to books, Mr. A. would recommend Tull's Essay on the principles of Vegetation and Tillage,

\* As to the virtues of burnet:—Mr. A's. cows, in a dry summer when grass was scarce in the meadows, were put into an old hilly pasture, where burnet grows naturally; in consequence of which the cows produced an amazing increase of milk.

to learn the principles of the New Husbandry, which are very rational, and in general well explained by him, though his practice may probably be improveable by *some* change of crops, and *some* manure. He would also recommend Dr. Home's principles of Agriculture and Vegetation; Dr. Hunter's Georgical Essays; Randal's Semi-Virgilian Husbandry; Young's Tours, and also his Experimental Agriculture; though he has been very unsuccessful in his (juvenile) attempts, according to the Tullian mode, and differs from Mr. A's. present opinion, in respect to the necessary quantities of seed-wheat, in which he thinks Tull, on a fair trial, well managed, on ground in the necessary perfection of tilth, would be found nearer the mark: Nor ought Dr. Harte's Essays on Husbandry to be forgotten. But Mr. A. has preferred the sowing of lucerne in rows, horse-hoeing the intervals, to the Doctor's mode of planting, and finds it to answer well. He also thinks Duhamel's and Chateauvieux's experiments in Geneva, and Wynne Baker's in Ireland, under the direction of the Dublin Society, well worthy the attention of every pupil in the drill-husbandry.

## ARTICLE VI.

*On the Culture and Course of Crops proper for heavy Clay Lands, and which are best adapted to render Fallow unnecessary.*

[By an Essex Farmer.]

MR. RACK,

THE course of crops best adapted to prevent the necessity of fallowing our heavy clayey lands is (with a little alteration) that you have mentioned in your last letter,\* provided such lands are rich enough to bear those crops. It is certainly a principal part of good husbandry to suit the land with an agreeable change or course of crops: But some of our strong or stiff clay lands are so poor, that let the change be what it will, if we take more than two crops after a good fallow, it impoverishes the land to such a degree, that a summer fallow will not restore it to its former state. Experience has fully proved that such farmers as take but one crop, to a good fallow, off such lands find it answer their purpose best. Many of our lands are so poor, that the second crop does not pay the usual expence, considering how much it hurts the next fore crop.

\* See Course of Crops in following letter.

An experienced farmer knows his land, comparatively speaking, as he knows his horses. If his horses are in good condition, and occasion require it, they are able to go a double journey, if nothing unusual befalls them. In like manner we know our lands; if they are in good condition, and it pleases God to second our endeavours with a suitable season, will yield a good crop: but if we know that our land is not in condition to bear a good crop, we had better fallow it. There is no profit in a bad crop: for although it costs little, it not only yields little, but leaves the land in worse condition than it was before such crop. I now occupy a field which yielded me eight good crops successively in as many years; though before I took it, by being too often cropped, and by careless management, it became so foul as to produce only eight bushels of wheat per acre. This change was effected by keeping it clean, by seasonable ploughings, and a suitable course of crops. First, I made a fallow, and manured it with dung. My course of crops were,

1. Turnips; 2. Barley; 3. Clover; 4. Wheat.

I then ploughed up the land, and gave it four dry tilths, with a sowing tilth before I sowed it in the spring. My fifth crop was oats; the sixth  
clover

clover and rye-grass; the seventh pease; and the eighth barley. But this land lies near a large town,\* and had been mended with town-dung for many years. I ploughed it as deep as the soil would admit. The soil was a mixed one, consisting of clay and under loam; and part of it had a gravelly bottom neither too dry nor too wet.

It appears to me, that in many instances, it is the suitable *mixture* of manures that makes the improvement, rather than any thing else we can account for.

We find that chalk and clay are as poor soils as any we know of: Yet I have found that by mixing these properly, and laying suitable quantities on as poor land as any in Essex, the land yielded as good a crop as any I ever ploughed. I am therefore of the opinion there might in the same manner be found a proper manure for our stiff clays; and when it is made rich enough, the course of crops you have mentioned would do very well.

I am trying experiments to find a proper mixture of manures for this purpose; and when I have satisfied myself, I will inform you what it is.

\* Bocking.

I have

I have seen on our poor lands a course of crops that have answered as well as could be expected for such soils. After a good fallow,

- |                          |                            |
|--------------------------|----------------------------|
| 1 Barley                 | 4 Vetches, fed all summer, |
| 2 Clover, fed all summer | or as long as there was    |
| 3 Wheat                  | feed.                      |

Then, by ploughing, get it in good order for barley, and some for wheat; which, by this agreeable change, did beyond expectation.

I am, &c.

J. L.

ARTICLE VIII.

*Extract of a Letter from Arthur Young, Esq;  
to the Secretary.*

*Bradfield-Hall, Nov. 27, 1782.*

MR. RACK,

THE Turnip Husbandry, wherever well introduced, has proved equal to the great object of the entire exclusion of the summer fallows, and is one leading step to the setting them universally aside.

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I can



I can easily conceive that as Husbandry improves in your counties, summer fallowing, oftner than common, will be esteemed an improvement; and an improvement with which your farmers, like those of Scotland, may set down contented.

But it ought to be a great object with the Bath Society, to attempt at once *perfect* husbandry, which may possibly be as easily introduced as the other. This perfect husbandry is to banish fallows from wet strong lands, as turnips have banished them from dry ones.

The only general crop that will effect this, is Beans. Suppose therefore, the Society should offer a premium for a course of crops to render summer fallowing unnecessary on strong lands, leaving the rotation of crops to the candidate; only specifying the following as practised in different parts of the kingdom with great success:

1 Beans	1 Beans	1 Cabbages
2 Wheat	2 Oats	2 Oats
3 Beans	3 Clover	3 Clover
4 Wheat	4 Wheat	4 Wheat
5 Beans	5 Beans	5 Beans
6 Wheat	6 Oats	6 Wheat

... With

With respect to wheat, if the land be good, the mere article of lessening the quantity of seed so profusely thrown away in the broadcast method, will increase the crop. But would not this effect arise from simply sowing a less quantity, as it is much cheaper than setting by hand? Much more might I ask, would it not flow from Mr. Duckett's husbandry?—That of trenching (very shallow) clover leys, so as to admit his furrowing plough, and by that means drill as small a portion as you please, at nine inches equidistant.

Till this experiment is made very accurately, I am only convinced, that the farmers hitherto have used too much seed, and that sowing less is beneficial. The practice of setting by hand does not spread much here, but in Norfolk it does.

I am, with great regard,

Your most obedient servant,

ARTHUR YOUNG.

## ARTICLE IX.

*Account of a Crop of Potatoes raised in 1782.*

[By a Gentleman Farmer in Wiltshire.]

MR. RACK,

**I**N compliance with your request, I send you an account of the culture and produce of a field of potatoes last year.

The field was four acres and a half, the soil very poor, being light, loose, and sandy, not worth more than 10s. per acre; it had been laid down with grass two years. In January, I carried on ten waggon loads of dung per acre; and the month following folded it over with my sheep, and then ploughed it as deep as the ground would bear, and harrowed it smooth.

In March I planted my potatoes, 18 bushels per acre: I had them cut in two, three, or four pieces, according to their size, and let them in with iron bars, in ranks two feet asunder, and one foot distant in the ranks. They were of the large white kind, with large eyes, but I know not the  
name.

name. Soon after they were up I had them hand-hoed, and a little while after horse-hoed them. The horse-hoe I used was so constructed as to earth them up at the same time, and performed the work so well, that I think it contributed greatly to the success of the crop. Nothing more was done till the latter end of October, when I began taking them up.

The produce was four hundred and eighty bushels per acre, or one hundred and sixty sacks. Any person bringing sacks, and taking them on the spot, had them for four shillings per sack.

The expences of feed, planting, cutting, hoeing, and taking up, were as follows per acre:

	£.	s.	d.
Eighteen bushels planted per acre, at 2s.	1	16	0
Cutting the said 18 bushels	0	6	0
Hand-hoeing 4s. horse-hoeing 2s, per acre	0	6	0
Planting per acre	0	8	0
Expence of taking up per acre	2	8	0
Total	£. 5	4	0

N. B. The expence of pitting and carrying home not included.

Produce 160 sacks per acre, reckoned only	} 32 0 0	I wish
at 4s. a sack		
F 3		

I wish it were in the Society's power to recommend strongly and effectually the culture of at least an acre or two of potatoes annually in every parish\* for the use of the poor only; as they could not be said to want food, if they had a plenty of this valuable root.

I am, &c.

J. A.

Feb. 27, 1783.

#### ARTICLE X.

#### *On the Virtue of Ashes as a Manure.*

[By a Correspondent Member.]

GENTLEMEN,

FROM the enquiries I made when at Bath last winter, I find that ashes are but little used as a manure in the western counties. As I have some reason to believe this neglect is owing to the

\* We cannot but earnestly recommend this gentleman's proposal as an exceeding good one. Were the country parishes, where the poor are numerous, to plant potatoes at their own charge, and have them delivered out as a part of the weekly allowance made to paupers, it might have a good effect, and be the cheapest method of relieving many of the poor, in winter especially.

use

use and virtue of ashes not being generally known, I beg leave to offer you a few remarks on the subject, which arise both from my own observation, and from the accounts given by those who have experienced the advantages arising from the use of ashes judiciously applied to their lands.

All ashes produced from vegetable bodies contain fixed salt, blended with the earthy particles; and from these it is, that the alkaline salts, called pot-ash, pearl-ash, &c. are extracted.

Mortimer tells us, that ashes of *all* kinds contain in them a very rich fertile salt, and that, therefore, they are the best of any manures for cold land, especially if kept dry, and the salts be not washed away by the rains. One load of *dry* ashes will be equally efficacious with two loads that have been kept wet: Two loads of the former will be sufficient for an acre. And that they are very efficacious is experienced by many persons in the eastern and northern counties, where great improvement has been made by burning ferny stubble, bean stalks, heath, furze, and sedge.

Coal ashes are somewhat different in their nature, and being of a calcarious quality, are par-



ticularly beneficial to four stiff soils: For this purpose they are very successfully used in the neighbourhood of London, Norwich, and some other great cities, where coals are generally burnt as fuel. They open and meliorate clayey lands, and correct their ungenial qualities.

They are also very useful in bringing into order grounds which have been dug for brick earth; as is well known in the neighbourhood of London.

After spreading these ashes on the clay bottoms, they plough them in, not very deep, and then sow horse beans, or sometimes lay them down with ray grass, which mostly succeeds very well.

Mortimer and Bradley both agree, that sea-coal ashes are the best and most lasting manure for cold lands; and the fittest to kill worms and other insects.

Even so early as in Mr. Worlidge's time they were looked upon as excellent compost, when mixed with horse-dung. And he tells us, that they kill moss and rushes in moist grounds.

Ashes

Ashes from kilns, where straw and furze are burnt, are a very good manure for most kinds of soil. Many farmers use them as a top-dressing for corn and grafs, but they should never be laid on in windy weather. They succeed best just before rain or snow falls, as these wash them into the soil.

Peat ashes are also a very good manure, especially if mixed with lime before they are spread.

Ellis in his *Modern Husbandry* has judiciously observed, that there is a considerable difference between the ashes of lean peat and those of the fatty kind.

If barley be sown so late as in May, *lean peat* ashes in particular may be applied over it, or harrowed in with the grain. But ashes burnt from fat black peat, such as is dug about Newbury in Berkshire, and in some parts of the Isle of Ely, are of so sulphureous a nature, that farmers are afraid to lay them on their barley; nor do they dress their wheat with them till late in the spring.

The earth, of which these rich ashes are made, is taken from a black moorish ground, with narrow

row wooden scoops, which bring it out in the form of a long brick. After being dried, they are burnt in large heaps, admitting as little air to the fire as possible.

The great use of these ashes was discovered near eighty years ago; but, like some other things, they soon fell into disgrace by injudicious management; some people imprudently laid them on their lands in too large quantity at a time, by which means their corn was burnt. But afterwards they found that about eight bushels were sufficient to be sown over an acre of wheat, pease, turnips, clover, rape, or sainfoin; and this as early as possible.

These ashes contain at least double the quantity of sulphur that is found in any other. And therefore, if sown too thick, and a dry season should ensue, they are apt to burn the tender fibres of the corn.

They destroy slugs, on pease crops and other grain, better than any thing. But no danger need be feared from the ashes of peat or turf, which grow on sandy bottoms, and contain the roots of thyme and heath.

Soap

Soap ashes are a composition of wood ashes and lime, which remain after the soap-makers have drawn off their lye or lees.

Two loads of these ashes are sufficient for an acre of arable land; and by the assistance of this manure, the ground will not only yield a large crop, but may be sown constantly without fallowing for many years together. They should be laid on in the beginning of winter, that the rain may the more easily dissolve and wash them in. Sir Hugh Platt tells us, that by manuring a piece of barren land in Middlesex with these ashes, in the year 1594, he obtained an excellent crop of summer barley.

I have in many experiments found great advantage from the soapers ashes on cold four meadow land, and am fully convinced, that if any farmer can procure them, including carriage, at the expence of twelve shillings a waggon load, they will be the cheapest and most profitable manure he can lay on such soils.

I am, &c.

J. B.

ARTICLE

## ARTICLE XI.

*From the Rev. Mr. Swayne, of Pucklechurch, in Gloucestershire, with Specimens of Grass Seeds.*

MR. RACK,

THE parcels which accompany this contain a quantity of the fine Bent Grass seed in the blade, and a little of the Crested Dogtail ; which, with what I have before transmitted to you, complete a small collection of the grass seeds, for which a premium has been offered by the Society for these three years past. The difficulty of collecting them has been much greater than I at first apprehended. But as a separate cultivation of the good grasses appears to me to be a great desideratum in the system of agricultural improvements, and as the Society had hitherto failed of obtaining any seeds to begin their experiments with, I was determined to procure, this season, if possible, some seed of each of the sorts advertised in the Society's list.

In this pursuit, from the earliest part of the spring, I made my observations on the several grasses, as they occurred to me in my walks about  
the

the fields. I remarked those particular fields and meadows where each sort grew in the greatest abundance. I picked specimens of each when in full bloom, and carefully compared them (being myself but a novice in Botany) with the descriptions of the grasses given in Dr. Withering's Botanical arrangement. I examined them in their growth from time to time, and, when ripe, attended to the gathering them with unremitting application.

Had I not taken these methods, notwithstanding my great desire to accomplish this my favourite scheme, I should, most probably, have been unsuccessful; or, if not wholly unsuccessful, should have collected so small a quantity as would have been unworthy of the Society's acceptance.

For the early grasses, such as the Annual Poa, Vernal, and Meadow Foxtail, though very conspicuous when in blossom, (and indeed more so than many other grasses;) yet, when their seeds ripen, are wholly overtopped, and almost obscured by the tall oat, rough cockspur, meadow fescue, and other surrounding grasses, which being naturally of a taller growth, and springing in a warmer season, consequently vegetate with much greater luxuriance.

If



If I had neglected to cultivate an inanimate acquaintance with them in their flowering state, I should, most likely, have been deceived by their appearance at seed time, and have gathered improper species. This I suspected, and therefore took that necessary precaution to guard against it. Besides, the seeds of most of the grasses fall from the husks within a very short time after they are ripe, and many of them before to appearance they are so : So that if they are not carefully and constantly watched, a few days neglect will deprive you of the opportunity of collecting them for the whole season. This, I am afraid, will prove an obstacle not easily to be surmounted in the cultivation of some of these grasses ; though there are others of them, which I believe will be found the most valuable, that do not come under this predicament.

Even with all my care and attention I have not succeeded to my wishes. I could have wished to have presented to the Society a much larger collection of the whole ; being apprehensive, from the total deficiency of former years, that I shall at present prove to be the only labourer in this harvest. But there is one sort, viz. the Meadow Foxtail, in which I have been particularly unfortunate ;

fortunate; and this, through a defect which I had no suspicion of at the time of its blossoming. At that time I had remarked this species to be peculiarly beautiful and flourishing; but, on rubbing out the husks, when I judged the seed to be approaching to ripeness, I found almost every seed-vessel occupied by a soft substance, of a deep yellow or orange colour, no ways resembling a seed. On applying the microscope, this substance proved to be a congeries of animalcules; which, being shook out on a sheet of white paper, and separated from each other, displayed the exact shape and motion of those insects which are oftentimes found in hams and bacon, and which are known among housewives by the name of hoppers. The flies likewise, which these caterpillars produce, were found to be very like the hopper-flies, only infinitely smaller.

I examined this grass on many different soils and situations, but it still presented the same appearance. This deterred me from any farther attempts to collect it this season; as it had been to no purpose to have gathered a large quantity of straw, without the chance of obtaining some seed from it. Whether it is usual for it to be infested with these insects in every season, I am not  
at

at present able to discover. But this I am assured of, that if it be not an extraordinary circumstance, it will for ever prevent the raising of this grass by seed, from becoming a general operation in agriculture.

I beg leave to subjoin a few remarks on each of the grasses I have collected, in the order they were found to ripen, with the view that they may probably be of some little use to the person who is to direct the cultivation of them.

1. The first was the Annual Poa. Of this I gathered a quantity so early as the month of April. Its seeds drop off before they are dry, and, to appearance, before they are ripe. The utmost care is therefore necessary in gathering the blades, without which, very few of the seeds will be saved. It ripens from the middle of April, to so late, I believe, as the end of October; but mostly disappears in the middle of the summer. It grows in any soil and situation, but rather affects the shade.

2. The second was the Vernal. This cost me more labour and time in collecting, than either of the other sorts, owing to its being surrounded with  
taller

grasses at the time of its ripening, and being almost hid among them. If it be not carefully watched when nearly ripe, and gathered within a few days after it comes to maturity, great part of the seed will be lost. The twisted elastic awns, which adhere to the seed, lift them out of their receptacles with the least motion from the wind, even while the straw and ear remain quite erect. It was found mostly in the moist parts of meadows; very little of it on dry pastures. It flowers about the beginning of May; is ripe about the middle of June.

3dly. The Meadow Foxtail. This occurred in most meadows, particularly near hedges. It flowers somewhat later than the Vernal, and is ripe the latter end of June.

4thly. The Flote Fescue. This was found only in pools, wet ditches, and other very springy places. Its seeds drop off with the least touch, before they are nearly dry. It flowers the latter end of May, and is ripe in June.

5thly. The Great Poa. This grass affects chiefly the dry parts of meadows; though it is to be found on most good pastures. It is more

retentive of its seeds than either of the grasses I have met with ; it may therefore be suffered to remain till the stalks are quite dry. It blossoms the beginning of June, and its seeds are ripe in July.

6thly. The Common Poa. This I should rather call the *Great Poa* ; the flowering stalks being of a much taller growth than the former : But this the Linnæan system forbids. One of the specific characters of the common Poa [*Poa trivialis*] in that system is, that it contains only three florets in each little spike, which perfectly agrees with this grass : Whereas the *Great Poa* [*Poa Pratensis*] is described as containing *five*, which answers to the former. I have observed this grass to grow in great abundance, even to the exclusion of almost all other kinds, in those places in meadows over which the water has been constantly flowing the whole winter.

I am quite of opinion that this is the grass which the very ingenious Mr. Anderson, in his Disquisitions on Agriculture, wishes to distinguish by the name of the *Vernal soft Grass*, and which he is certainly mistaken in supposing to be the *Holcus Lanatus* of Hudson.

This

This very accurate description leaves me no room to doubt that it is this very grass, viz. the Common Poa. The circumstance of its flourishing so much when almost constantly overflown, seems to premise, that it will prove a most valuable grass for water meadows. It flowers the beginning of June, tho' something later than the former, and ripens the beginning of July. The pannicle and stalks may not be permitted to stand till they are dry like the former, but must be gathered before the seeds are scarcely ripe, or the greatest part of them will be scattered on the ground.

7thly. The Sheep's Fescue. I apprehend this to be the most valuable grass of all. It was observed to grow and thrive on lands of all qualities and in all situations, from the driest upland pastures, to the very moist parts of meadows. It does not part with its seeds till some time after they are ripe, and even quite dry. It makes the thickest and closest pile of any of them, and sends up but few flower-stalks in proportion to its leaves. I am almost persuaded, that this grass will hereafter become as generally cultivated as Ray-grass is at present. It flowers in June, and is ripe in July.



8thly. The Meadow Fescue. This was found universally in meadows and rich pastures. Is rather a coarse grass, and does not retain its seeds near so well as the former. It flowers in June, and is ripe in July.

9thly. The Yellow Oat. This abounded chiefly in dry pastures. It retains its seed better than some others of the grasses; flowers in June, and is ripe in July.

10thly. The Crested Dog's-tail. Which is a very common grass, affecting rather dry land; and is the easiest of the whole groupe to collect a quantity of seed from. It flowers in June, and is ripe in July.

Lastly. The Fine Bent. This grass, the second in the Society's list, flowers and ripens its seed the latest of them all. It seems to be lost the former part of the year, but vegetates luxuriantly towards the autumn. It appears to be fond of moist ground. It retains its seed till full ripe; flowers the latter end of July, and is ripe the latter end of August.

I am, your most humble servant,

G. SWAYNE.

Pucklechurch, Sept. 15, 1781.

P. S. I have

P. S. I have preserved specimens of the above grasses, and several others collected this summer, which I shall beg your acceptance of, as soon as an opportunity presents itself of transmitting them with safety.

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## ARTICLE XII.

*On watering Meadows; and the Kinds of Water found most efficacious for that Purpose.*

S I R,

Piddletoun, March 8, 1783.

SOME time since I was favoured with your's. A variety of avocations of my own, and a severe illness of a great and good friend, whom I very much wished to consult, have occasioned this seeming neglect. My experience and knowledge of the subject you are, in the name of the Society, so flattering as to request me to give, are very much at their service.

To the question, "What water do the farmers in your county prefer?" I can easily answer, "That which has run some course, particularly

when it has been assisted by the run of farm-yards, arable-lands, sheep-flights," &c. &c. This is the general opinion of the waterman and farmers here; they all agree that the less the water is strained, and the nearer they take it from the river, the better it is, and the more it enriches the meadows, particularly when assisted by the run of yards, &c.

When they are asked to explain "What they mean by being *less strained*?" They say it is when the water is taken immediately out of the river, stream, &c. and conveyed upon the land, running directly off by the drains into the river again. If instead of returning into the river, it is again conveyed upon the lands below, and thus repeated, it is then said to have been strained, and not so efficacious; but if it is taken out of the stream again, after it has run some way in the course, it is then called head-water, and used with success. This is nearly the general idea of the country. I own it has never been satisfactory to me, and I just hinted as much in the essay.

If an enquiry is made, "Where, and which are the best water-meadows?" *Those above us.* Enquire there. *Those above us* are better than  
ours,

ours, *for the water has not been so much strained.* This must, if repeated, soon carry us very near the spring-head.

I beg to be understood, that when I mention the *spring-head*, the particular spot where the spring rises is not meant, but as far below it as there is any appearance of springs in or near the bed of the stream, which will oftentimes in small rivulets be one, two, or more miles, below the spring-head. Nor is there a moment's doubt but that at a very considerable distance below, there are many very good water-meadows equal to those higher up, but not in general; the variety of soil, (for some may be found better there than at the spring-head) and other local circumstances, I presume, occasion it.

This subject has often engaged my attention when I have been in meadows formed of a variety of soils. Every one readily admits, that the same water, at the same time, will have different effects upon different soils; such as, a cold clay; a warm sand, or gravel; and a boggy, deep, corky soil; therefore something must be attributed to the soil.

To explain myself more fully, I beg leave to class the lands capable of being watered by small streams, or rivulets, into three divisions.

The first, are those lands which lie at or near the spring-head. The soil of this division is generally a light loam, tolerably firm though wet, and not more than from six inches to a foot deep; the under-stratum a springy gravel. This class (as I said before) extends often much farther down the stream in some vales than others.

The second division I begin to distinguish where the soil gets deeper and heavier, often inclining to a clay or clayey loam, with some gravel in it. (This species is very cold, and the grasses spring late.) Under this class may be reckoned a black, spungey, loose, corkey soil; the stream here, (which before was small) becomes larger considerably, and the lands on each side, which before were narrow, now spread to a considerable breadth. Under this division the larger quantity of water-meadow in this country falls.

The third division is composed of those lands which lie flat, the soil very deep and loose, often a morass, the bed of the river a bottomless ooze;  
a ware

a ware cannot well be erected across it, nor the water drained off; little use is therefore ever made of it.

Upon lands of the first division, the water, though mostly perfectly clear, issuing immediately from the springs, and without any foreign assistance, has an amazing effect; the fertilizing quality is really astonishing. Meadows under this description, if eaten quite bare in the month of May, will, in *five, six, or seven* weeks, have as much grass in them as the mower can throw out with his scythe, (half a crown an acre generally given for mowing) from one to two and often three good waggon-loads an acre. Add to this, the herbage being better, is of more value, and the meadows justly esteemed the best.

Lands of the second division are certainly greatly benefited by the water being thrown over them, perhaps as much as the other, considering the difference of the two soils in their natural state. This water has received all the advantages of the run of farm yards, street dirt, arable lands, &c. the produce is very great. The quality, and indeed the quantity, is (I believe) always in proportion



portion better or worse, as the soil and situation approach the first or third division.

Lands under the third description, I have had no experience in. I have hardly ever heard that any thing is made of them. Their produce is rushes, sedge, and a coarse three-square grass.

I think it reasonable to believe, that the second division of land is greatly improved by the water's having been assisted by the adventitious increase of the running of farm-yards, &c. falling into it in its passage. And it is probable, that the first division would be improved, if the second division of water could be conveyed upon it; but whether equally so as with its own water, is a question.

I think I am justified in saying, that the second sort of land would be vastly improved by the first division of water being thrown over it. I ground my opinion upon an observation I have frequently made, that in a series of dry weather, when the stream from the springs, as I imagine, could not have received any foreign aid, being conveyed over lands of the second division, and as clear as if it had issued immediately from the spring head,  
the

the vegetative powers, particularly if in warm weather, have been so wonderfully exerted, that in a few days a beautiful verdure has succeeded a parched rusty appearance. Here I think a question arises, "Whether the soil, or the quality of the water, contribute most to make the first division of land better than the second?" And I should be very glad to see a reason given, why perfectly clear water being thrown over the meadows in the warm months, and kept there a few days too long, not stagnated, should, when drawn off, leave a thick scum upon the grass, which soon becomes so glutinous, as to attain a substance not unlike white leather?

I have just seen a letter from Mr. Young, saying, that Dr. Priestley has given a new theory of vegetation, by his Phlogiston, contrary to his opinion; and as the Doctor quoted page 11, Treatise on Water-Meadows, in support of it; Mr. Young wishes me to inform him, "Whether I did not know instances to the contrary?" I am by no means equal to the task of entering into the merits of the dispute. My experience justifies me to declare, that I have seen as great improvement upon land watered with quite clear water, as I ever did by thick muddy water.

I have

I have had the pleasure to see a copy of Mr. Wimpey's letter to you: I am happy to find the subject treated in so masterly a manner; and am not surprized to find him differ so much from me in what he says upon land springs; they probably have not fallen so much under his observation. I write from facts that are every day under my eye.

You will be pleased to observe, upon the whole, I by no means declare that the run of farm-yards, &c. is not assisting; quite the reverse: I believe it does a great deal. All I contend for is, that clear water appears at and near the spring-head to have every advantage the other has below, and that the quantity of herbage is greater and the quality better. The reason I submit to the curious; but viewed in every light, the quantity of land of the first division is so small compared with the second, that in point of national utility there can be no doubt.

And I candidly own, that there are springs issuing out of the bogs in heaths, of which no use is made, because, *they say*, the water has no enriching quality belonging to it; but there the  
foil

foil is a deep bog inclining to a morass, and, excepting in the winter, little water issues out.

I am, Sir,

Your most obedient humble servant,

GEORGE BOSWELL.

P. S. The part of the country I am situated in is every where surrounded by chalk hills, some near the springs, and no where more than two miles distant (visible.)

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ARTICLE XIII.

*On divers Articles of Norfolk Husbandry.*

[From a Gentleman Farmer near Norwich.]

DEAR SIR,

**I**N answer to your enquiry about the setting of wheat, from my own observations near home, and the information of others from different parts of this county, I find it is become general, and this year almost universal, owing in part, perhaps, to the high price that grain now bears.

We

We have neither hit upon, nor indeed attempted, any other course of crops on our strong heavy lands than those we practise on our light soils. Turnips well hoed twice are equally cultivated upon both, and without any material inconvenience to the farmer, or injury to the land. On the light soils, we feed them off with stock in the field where they grow : On heavy wet lands, we draw them and carry them off in light carts to be eaten either in some grass or unploughed stubble field, or in the houses or yards at home.

I prefer the latter practice much, and have always used it, although the greater part of my farm would very well admit of feeding them where they grow. My reasons for preferring this latter method are, that there is no waste of the turnips ;—that the food comes equally fresh to the beasts every day ;—that the protection from cold and wet weather, which the cattle enjoy in houses, or well fenced and shedded yards, (as mine are) contributes very much to their health and fattening ; (much more so, indeed, than is generally conceived) and that by this means I collect and preserve all their dung to be laid on such fields, and at such times, as will be most beneficial to the ensuing crops. These advantages are all lost in  
the

the method of feeding off the turnips on the fields; for even half the dung of the beasts, feeding in the fields in the depth of winter, is lost by being dropt under the hedges or trees, to which after filling themselves they fly for shelter and warmth.

The expence of carting away an acre of turnips depends on the goodness of the crop, and is from ten to fifteen shillings; which although it is much more than saved in the preservation of the turnips from waste, yet inclines the covetous and indolent to feed them off the land; for they flatter themselves they have no waste while they have lean sheep or bullocks which will eat up the offal which the fat ones have left, not considering how much better their second or lean stock would thrive with clean and fresh food.

You ask me, if beans and wheat alternately would not obviate the necessity of fallowing heavy lands, and prove for a considerable length of time a beneficial mode of cropping the ground. As I have not experienced the thing, I can only conjecture, and tell you, that some little time since I intended to have tried the experiment on two pieces of stiff wet ground, which I have laid to  
grass,



grafs; and that I have very little doubt but that if the bean crops be sometimes manured for, and always well hoed, this mode would be a most profitable one, and, for any reason I can see to the contrary, might endure for ever; but still, as it does not raise winter food for cattle, I must, for the sake of their dung, prefer turnips to it wherever they can be raised.

I am, Sir, with sincere regard and esteem,

Your humble servant,

T. B.

#### ARTICLE XIV.

#### *On the Cultivation of Barley.*

[From a Gentleman Farmer in Norfolk.]

GENTLEMEN, S—m, Jan. 4, 1781.

THE method of raising barley is in general so well understood, that it may perhaps be thought impertinent in me to offer any thing on that head. But as the gaining a knowledge of the different modes of practice in different countries seems to be one part of your design, I will take

take the liberty of sending you a few hints relative to this branch of husbandry.

The best soil for barley is that which is dry and healthy, rather light than stiff, but yet of sufficient tenacity and strength to retain the moisture. On this kind of land the grain is always the best-bodied and coloured, the nimblest in the hand, and has the thinnest rind. These are qualities which recommend it most to the maltster. If the land is poor, it should be dry and warm; and when so, it will often bear better corn than richer land in a cold and wet situation.

In the choice of your seed it is needful to observe, that the best is of a pale lively colour, and brightish cast, without any deep redness, or black tinge at the tail. If the rind be a little shrivelled, it is the better; for that slight shrivelling proves it to have a thin skin, and to have sweated in the mow. The necessity of a change of seed by not sowing two years together what grew on the same soil, is not in any part of husbandry more evident than in the culture of this grain, which, if not frequently changed, will grow coarser and coarser every succeeding year.

It has generally been thought that seed-barley would be benefited by steeping; but liming it has, in many instances, been found prejudicial. Sprinkling a little foot with the water in which it is steeped, has been of great service, as it will secure the seed from insects. In a very dry seed-time, barley, that has been wetted for malting, and begins to sprout, will come up sooner, and produce as good a crop as any other.

If you sow after a fallow, plough three times at least. At the first ploughing, lay your land up in small ridges, and let it remain so during the winter, for the frost to mellow it; the second ploughing should be the beginning of February. In March split the ridges, and lay the land as flat as possible, at the same time harrowing it fine. But in strong wet lands (if you have no other for barley) lay it round, and make deep furrows to receive the water.

I have often taken the following method with success: On lands tolerably manured, I sowed clover with my barley, which I *reaped* at harvest; and fed the clover all the following winter, and from spring to July, when I fallowed it till the following spring, and then sowed it with barley  
and

and clover as before. Repeating this method every year I had very large crops, but would not recommend this practice on poor light land.

We sow on our lightest lands in April, on our moist lands in May; finding that those lands which are the most subject to weeds produce the best crops when sown late.

The common method is to sow the barley-feed broad-cast at two sowings; the first harrowed in once, the second twice; the usual allowance from three to four bushels per acre. But if farmers could be prevailed on to alter this practice, they would soon find their account in it. Were only half the quantity sown equally, the produce would be greater, and the corn less liable to lodge: For when corn stands very close, the stalks are drawn up weak, and on that account are less capable of resisting the force of winds, or supporting themselves under heavy rains.

From our great success in setting and drilling wheat, some of our farmers tried these methods with barley, but did not find it answer their expectations, except on very rich land.

I have myself had eighty stalks on one root of barley, which all produced good and long ears, and the grain was better than any other; but the method is too expensive for general practice. In poor land, sown thin, or your crop will be worth little. Farmers who do not reason on the matter, will be of a different opinion; but the fact is indisputable.

When the barley is sown and harrowed in, the land should be rolled after the first shower of rain, to break the clods. This will close the earth about the roots, which will be a great advantage to it in dry weather.

When the barley has been up three weeks or a month, it is a very good way to roll it again with a heavy roller, which will prevent the sun and air from penetrating the ground to the injury of the roots. This rolling before it branches out, will also cause it to tiller into a greater number of stalks; so that if the plants be thin, the ground will be thereby filled, and the stalks strengthened.

If the blade grows too rank, as it sometimes will in a warm wet spring, mowing is a much better

better method than feeding it down with sheep, because the scythe takes off only the rank tops, but the sheep being fond of the sweet end of the stalk next the root, will often bite so close as to injure its future growth.

By attending to what I here recommend, many of our farmers usually get forty bushels of barley per acre from land of no extraordinary quality. On some that is rich, I have had fifty-two bushels without manure; but I never sow more than ten, and often only eight pecks of seed per acre.

I am, &c.

J. S.

#### ARTICLE XV.

*On the Advantages of cultivating Turnips,  
Scotch Cabbage, Lucerne, &c.*

[From a Gentleman Farmer in Hertfordshire.]

GENTLEMEN,

H—n, March 6, 1781.

**B**EING disappointed of seeing your Secretary when I was at Bath last month, I take the liberty of communicating by letter, a few ob-

H 3

servations,



servations, which I intended to have made to him on the number of cattle and sheep which may be fed on crops of turnips, turnip-rooted cabbages, and Scotch cabbages, of a certain given weight, by which the comparative value of such crops may be accurately estimated.

When sheep are allowed as many turnips as they will eat, (which should always be the case while they are fattening) they will on an average consume near twenty pounds each, in 24 hours.

An acre of turnips twice hoed, will, if the land is good, produce about fifty tons; which will, on the above calculation, maintain one hundred sheep fifty-two days. My sheep weigh twenty pounds a quarter.

Turnip-rooted cabbage will produce from twenty-five to thirty tons per acre; and for *spring-feed* are certainly the most valuable crop within the whole circle of husbandry. They are invulnerable to frost, either in or out of the ground. When farmers are in the greatest distress for sheep-feed during the months of March and April, these are an unfailing supply, and afford more milk for the lambs than any other food whatsoever.

They

They are also a firmer and more substantial food than turnips, even if the latter could be had good in that season. I have kept them out of the ground near twelve months, through the extremes of heat and cold, and at the end of that time, a very few excepted, they were all found.

As the roots of this plant are firmly fixed in the earth, it is least trouble to feed them off; but if you want to plough early, they may be drawn with a prong, and if thrown on a dry pasture, they will keep equally good for sheep in the spring. An acre of turnip-rooted cabbage will maintain one hundred sheep a month, and sometimes five weeks.

Scotch cabbages, if they be the true flat-topped firm kind, are never affected by frost, a few of the outside leaves excepted. On land not worth more than twelve shillings per acre, I have had fifty-four tons per acre. An ox will in common eat about two hundred pounds in 24 hours. Twenty oxen therefore may be kept near five weeks on an acre of cabbages of that weight; but as the crops in general are not so large, we will reckon only a month, which will be cheaper than a score of oxen can be kept on any other food.

A sheep of twenty pounds a quarter will eat fifteen pounds of Scotch cabbages in twenty-four hours. An acre will therefore maintain two hundred sheep a full month.

When cows and oxen are fed with cabbages, their dung is more in proportion than when fed with turnips, which go off more in urine; or with hay, which is of too dry a substance. If the cabbages are planted in rows three feet apart, the intervals may easily be kept free from weeds by the horse-hoe, and the roots of the plants will receive great benefit by the ground being thus loosened about them. Cabbages being a meliorating crop, they do not impoverish the land nearly so much as grain.

I will now add a few remarks on Lucerne, a plant which merits every possible encouragement. Some years since I divided a field of two acres into four parts, and sowed it with Lucerne, in the following manner:—

1st part in drills three feet asunder.

2d part in drills two feet ditto.

3d part in drills one foot ditto.

4th part broadcast.

The

The soil was equal throughout the field. The seed was sown on the 24th of April; on the 16th of August I cut the whole field, and weighed the produce of each part separately.

That sown in three-feet drills produced only about half the weight of that sown broadcast, and the rest in proportion, lessening as the width of the rows increased. Having been taught to believe, that the three-feet drills would produce *most*, I was disappointed in finding that crop to be the least of any in the field, and too hastily reprobated the drill method of sowing it. I was however advised by a gentleman who understood the culture of this grass better than myself, to let the whole field remain three years, to give it a fair trial before I passed judgment. I did so. The second year the difference was greatly in favour of the three-feet drills; and in the fourth year they had a very decided superiority. I then found the true state of the case to be as follows:—

During the first year the plants in every part of the field were nearly equal in goodness; but as there was a much greater number of them on an equal space of ground in the part sown broadcast, the crop must of course be heaviest there; these plants  
being

as good the first year as afterwards. But in the course of three years, the plants in the three-foot drills became much stronger, spread amazingly, and nearly filled up the spaces between them. The produce of one root being more than that of any ten roots in the broadcast part, which by standing too close were impoverished, and could not increase in bulk like the others.

In the fourth year, the produce of the three-foot drills was more than double the broadcast, and being adapted to the horse-hoe, were kept free from weeds, and earthed up at a small expence, in comparison of the other.

At the end of the fourth year, I ploughed up the broadcast part, and planted it afresh, with roots from the one-foot drills, in rows three feet apart. The first season I thought they seemed stunted, and would come to nothing, but the following spring they shot forth vigorously, and were nearly equal to the other.

Transplanted Lucerne never produces any thing the first season; but in the second, it is generally as good as that of three years growth which has never been moved.

Weeds

Weeds are the greatest enemy to Lucerne, and the easiest and cheapest way of keeping the crop clean is to sow it in drills of sufficient width to admit the horse-hoe; which not only destroys them at the least possible expence, but greatly promotes the growth of the plants by earthing them up in the operation.

I am, &c.

J. D.

#### ARTICLE XVI.

*On the Utility of those Clubs called by the Name of Friendly Societies, in Country Parishes.*

GENTLEMEN,

**I** HAVE been a Subscriber to your Society from its first Institution, although from the remoteness of my situation it has not been in my power to attend more than one of your Meetings. Having however constantly received your Annual Premium Books, I have with pleasure seen a number of the Premiums judiciously offered, not only for the advancement of Agriculture, Planting,



ing, &c. but also as rewards for long-continued Industry and Good Behaviour in Servants, &c.

As I venerate every attempt, either in Societies or in Individuals, to promote useful Knowledge, improvements in the necessary Arts, and happiness in collective and civil Society, I wish to point out one subject which seems in a particular manner to merit your attention and encouragement :

This is, the establishment of Parochial *Friendly Societies* among handicrafts men and poor labourers; where these have been established, and conducted by prudent rules and regulations, they have proved very comfortable resources to many individuals, when age or affliction has disqualified them for labour, and also lessened Parochial expences.

The Funds raised by these Societies may be considered as so much money saved from the ale-house, to be applied in times of necessity to the best of purposes; and as each member contributes only *three-pence* a week, it is scarcely felt by individuals. But the advantage and relief which *seven shillings* a week affords to the *sick*, the *lame*, and the *aged*, is very comfortable; and they

they are thereby freed from the painful necessity of applying to their parishes for support.

As these *Friendly Societies* are founded on one of the wisest maxims in the code of human policy; —namely, *that it is easily in the power of the many to help the few*; I think they merit *public* encouragement and support. Therefore, if your finances will admit, you cannot, perhaps, bestow a few guineas better than in offering a premium to the following import:—

“ That a premium of ——— guineas will be given to the most numerous Society of this kind, of not less than forty members, which shall, within the year 1783, be established by labourers and handicrafts-men, in any country town or parish where no such Society is at present instituted. The said premium to be claimed as soon as the said Society of not less than forty members has subsisted one year.

“ All claims to be accompanied with a certificate signed by the Minister and Churchwardens of the Parish, containing an account of the number of actual members, and their names and occupations.”

I have

I have presumed to offer the above proposal on this principle, that whatever tends to make our labouring poor industrious and good œconomists, while in health, and to render them comfortable when under affliction, is worthy your consideration; and that these friendly Clubs or Societies have such a tendency is, I think, self-evident.

A poor man flattered with the hope of receiving seven shillings per week in any future sickness, will either work extra hours for the three-pence he has to pay, or save it from the ale-house. After he has been some years a member, it becomes habitual, and the fear of losing all the money he has paid in, by forfeiting all the advantage he as a member is entitled to in case of accidents or illness, will operate strongly in preventing him from declining his subscription.

I have talked with many poor men who are members of such Societies, and they all tell me they live as well as before, and find no difference at the year's end from having paid three-pence a week to their Club;—to use their own language, "*they don't feel it.*"—But in times of sickness, when they could not labour, they have joyfully felt the comforts which their little public fund yielded them.

You

You will pardon me, Gentlemen, for dwelling so long on the subject; but as it strikes me forcibly, I wish to impress your minds with correspondent ideas of its utility.

I am, yours, &c.

Wilts.

J. B.

N. B. We hope it will be a sufficient apology to our benevolent correspondent to inform him, that as his letter did not come to hand till the day after the Society's annual Meeting, the premium he has proposed could not be adopted this year. We are one with him in opinion respecting the utility of Friendly Societies among the poor, and assure him that his letter will not escape the consideration of this Society.

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#### ARTICLE XVII.

#### *Sundry Hints communicated by different Correspondents.*

GENTLEMEN,

**I**N the year 1740, the Sieur de la Revere, at Paris, obtained a patent for making flannels, velvets, and other stuffs, of the cottony down of the Apocynum, or Dog's-bane. When I was in France about the year 1767, I saw some of this manufactory, and found that it answered very well,

well, especially when a little wool was mixed with it before spinning.

I also found that this cotton had long been highly esteemed there for stuffing easy chairs, settees, and stools, and also for quilts, which rendered them very light and warm, the down being very elastic.

The great quantities of this down or cotton which our hedge-rows produce every autumn, might, I think, be applied to some such uses in this country, as it appears to be of the same kind as that used in France.

I beg leave, therefore, to propose, that your Society may direct a trial to be made; and if it succeed, that a premium may be offered for bringing it into common use.

W. I.

TRIFLING as the subject on which I address you may at first view appear, I flatter myself you will not deem me impertinent in wishing to have a remedy pointed out for an inconvenience which has long been felt and complained of.

Gravel

Gravel walks are some of the most useful and necessary ornaments in gentlemen's gardens; but the difficulty of keeping them clear from *green moss* is very great.

I therefore submit it to your consideration whether it might not be expedient for you to offer a small premium for the discovery of a cheap, easy, and effectual method of destroying it, and preventing its growth.

A GARDENER.

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I AM of the opinion that crops of grasses, as well as grain, might be much improved, and the quantity considerably increased, by a change of soil and situation, or, in other words, by changing the feed.

I some years since sowed a small field with marl grass seed, which I procured from a gentleman in Kent, and the crop was much superior to that of another field sown with the same kind of grass which had been raised in the neighbourhood; although the soil, and the quantity of seed sown per acre, were the same.

VOL. II.

I

There



There are mysteries in the nature and progress of vegetation, which no theory can account for. While the effects are evident, the cause remains inexplicable. Experience therefore is our best director, and *that* seems uniformly to prove the utility of a change of seed in almost every production of our fields as well as gardens.

J. W.

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THE following composition being an excellent colouring for pales, gates, rails, barn, and other outhouse doors, &c. I take the liberty of recommending it to your Society in particular, and to the public in general.

Melt twelve ounces of resin in an iron pot or kettle; add three gallons of train oil, and three or four rolls of brimstone; and when the resin and brimstone are melted and become thin, add as much Spanish brown, or red, or yellow oker, (or any other colour you want) first ground fine with some of the oil, as will give the whole as deep a shade as you like. Then lay it on with a brush as hot and thin as you can. Some days after the first coat is dried, give it a second. It will

will preserve plank for ages, and keep the weather from driving through brick-work.

W. T.

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As a proof of the surprising advantages that attend the planting or sowing wheat in drills, and the immense saving of seed by that method, I beg leave to mention the following instance, which fell within my own observation.

Some years since, Mr. Wheetly, of Morden in the county of Cambridge, planted an acre of land with wheat, leaving a foot space between every two kernels : The whole acre took up half a peck and one pint of seed, and the produce was thirty-nine bushels.

Many of our best farmers are now got into the method of planting their wheat as they do in Norfolk, and their success has overcome the most obstinate prejudices which the common people entertained against so excellent a practice. They generally plant about two pecks per acre by hand, and mostly on clover lays, at five shillings and six-pence expence. Your Society can never turn their attention to a more interesting object than

the rendering this practice general; and so far as their endeavours to extend it are successful, they will deserve the thanks of the nation.

R. M.

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*To preserve Seedling Turnips from the Fly.*

To a quart of turnip-feed add one ounce of brimstone finely powdered, putting both into a bottle large enough to afford room to shake them well together every day for four or five days previous to sowing; keep the bottle well corked. This has by long experience been proved never to fail.

G. K.

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*Method of destroying Weevils in Wheat.*

MONSIEUR de Brosès, first President of the Parliament of Dijon in France, finding that the insects called Weevils had got among some wheat at one of his farms, tried almost every method to get rid of them, but in vain, for his granaries still continued infested with this voracious insect. At length, being informed of a method to destroy them,

them, which was quite simple, and not expensive, and which had been practised with success in the province of Poictou, he set about it in the following manner:—

He got some live lobsters, which he threw on the wheat that was infested, and in four hours time the weevils came out from all parts, dispersing themselves over the walls in such numbers, that in many places they were quite black with them; and by this means they were all easily destroyed.

The smell of lobsters, particularly if left till they stink, always proves fatal to these insects, and yet will not in the least affect the corn. This remedy should be used as soon as the weevils appear, or begin to make their nests.

#### ARTICLE XVIII.

##### *On the Rot in Sheep.*

[From a Gentleman Farmer near Glastonbury.]

GENTLEMEN,

HAVING examined many sheep infected with the disease in the liver called the rot, I beg permission to trouble you with a few remarks

thereon, and which are principally intended to excite farther enquiry into the nature of this fatal malady.

That it is occasioned by the insects found in the liver, and which are called flukes, is very evident: But to account for their coming into the liver is not so easy.

I am of the opinion that they are swallowed with the sheep's food while in the egg state. The common, or most obvious objection to that opinion is, that this insect is never found but in the liver, or some parts of the viscera, of sheep that are diseased more or less; and that they must therefore be bred there.

But this objection will lose its force, when we consider that many insects undergo several changes, and exist under forms extremely different from each other. Some of them may therefore appear, and be well known under one shape, and not known to be the same under a second or third. The fluke may be the last state of some aquatic animal which we at present very well know under one or other of its previous forms.

If

If this be admitted, it is easy to conceive that sheep may, on wet ground especially, take multitudes of these ova, or eggs, in with their food; and that the stomach and viscera of the sheep being a proper nidus for them, they of course hatch, and appearing in their fluke, or last state, feed on the liver of the animal, and occasion this disorder.

On killing a sheep lately, which was seemingly in good health, I examined the viscera carefully, and in some of the passages leading to the liver, (which appeared turgid) I found a whitish thick liquor, which appeared to be all in motion. On applying a pocket glass, I found it contain thousands of these flukes, which were apparently just hatch'd, and about the size of mites. These, if the sheep had not been killed, would probably have soon obtained their usual size, and proved its destruction.

I am therefore of the opinion, that if experiments were made by some of the faculty, to discover what would most speedily kill these insects when taken fresh and alive from a diseased liver, it might lead to the discovery of something that might have the same effect when given internally



as a medicine. We find worms can be destroyed in the bodies of animals, and why not the fluke in the liver of a sheep? Miller says, that parsley is a good remedy for the rot in sheep: Suppose a strong decoction of this plant, or the oil extracted from its seed, were given to those diseased; it might possibly be of service.

I am, &c.

Street, near Glastonbury.

J. C.

#### ARTICLE XIX.

*On laying down Fields to Grass, and the Kinds of Grasses most valuable.*

[By a Correspondent in Suffolk, to the Secretary.]

S I R,

IN answer to your enquiries respecting our method of laying down fields to grass, and the several species of grasses most profitable, be pleased to accept the following remarks, which I hope will not be wholly unsatisfactory to your ingenious and public-spirited Society.

The

The latter end of August, or the beginning of September, is the best season for sowing grafs-seeds, as there is time for the roots of the young plants to fix themselves before the sharp frosts set in. It is scarce necessary to say, that moist weather is best for sowing; the earth being then warm, the seeds will vegetate immediately; but if this season prove unfavourable, they will do very well the middle of March following.

If you would have fine pasture, never sow on foul land. On the contrary, plough it well, and clear it from the roots of couch-grafs, rest harrow, fern, broom, and all other noxious weeds. If these are suffered to remain, they will soon get above, and destroy your young grafs. Rake these up in heaps, and burn them on the land, and spread the ashes as a manure. These ploughings and harrowings should be repeated in dry weather. And if the soil be clayey and wet, make some under-drains to carry off the water, which, if suffered to remain, will not only chill the grafs, but make it sour. Before sowing, lay the land as level and fine as possible. If your grafs-seeds are clean, (which should always be the case) three bushels will be sufficient per acre. When sown, harrow it in gently, and roll it in with a wooden roller.

roller. When it comes up, fill up all the bare spots by fresh feed, which, if rolled to fix it, will soon come up, and overtake the rest.

In Norfolk they sow clover with their grasses, particularly with ray-grass; but this should not be done, except when the land is designed for grass only three or four years, because neither of these kinds will last long in the land. Where you intend it for a continuance, it is better to mix only small white Dutch clover, or marle grass, with your other grass seed, and not more than eight pounds to an acre. These are abiding plants, spread close on the surface, and make the sweetest feed of any for cattle. In the following spring, root up thistles, hemlock, or any large plants that appear. The doing this while the ground is soft enough to permit your drawing them by the roots, and before they seed, will save you infinite trouble afterwards.

The common method of proceeding in laying down fields to grass is extremely injudicious. Some sow barley with their grasses, which they suppose to be useful in shading them, without considering how much the corn draws away the nourishment from the land.

Others

Others take their seeds from a foul hay-rick, by which means, besides filling the land with rubbish and weeds, what they intend for dry soils may have come from moist, where it grew naturally, and *vice versa*. The consequence is, that the ground, instead of being covered with a good thick sward, is filled with plants unnatural to it. The kinds of grafs which I would choose to cultivate in pasture-lands are, the Annual Meadow, Creeping, and fine Bent, the Fox-tails, and Crested Dog's-tail, the Poas, the Fescues, the Vernal, Oat-grafs, and the Ray, or Rye-grafs. I do not, however, approve of sowing all these kinds together; for not to mention their ripening at different times, by which means you can never cut them all in perfection and full vigour, no kind of cattle are fond of all alike.

Horses will scarcely eat hay which oxen and cows will thrive upon; sheep are particularly fond of some kinds, and refuse others. The Darnel-grafs, if not cut before several of the other kinds are ripe, becomes so hard and wiry in the stalks, that few cattle care to eat it.

Such gentlemen as wish a particular account of the above-mentioned grasses, will be amply gratified

gratified in consulting Mr. Stillingfleet on this subject. He has treated it with great judgment and accuracy, and those who follow his directions in the choice of their grasses will be under no small obligation to him for the valuable information he has given them.

The principal thing in the choice of grasses is, to sow only such in the same field as ripen nearly at the same time.\* By this means you will get finer hay than by any other method, and have much less trouble in making it.

I am, your most humble servant,

J. S.

\* Of what kinds these are, the reader will find an account, in the Rev. Mr. Swayne's very ingenious letter, page 76 of this volume.

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#### ARTICLE XX.

#### *On the Culture of Rape, or Cole.*

[From a Correspondent Member in Essex.]

GENTLEMEN,

PURSUANT to your request, I take the earliest opportunity of giving you an account of the method in which rape-feed is cultivated in  
this

this county, where it is raised in large quantities, and to great advantage.

This plant will do on almost any soil, but succeeds best on those that are deep, with a clayey bottom, with manure and deep ploughing.

We generally plough up the fallow early in the spring, and let it lie till the latter end of March. We then plough it again, after which we harrow it down, and lay on a coat of manure. After this is spread, we cross-plough it again in May, and get it in fine tilth by the end of June.

About the first of July, or the first rain after that time, we sow the seed, about half a peck on an acre. The seed is scattered with three fingers, broadcast, and the land lightly harrowed and rolled.

In September, we hoe it in the manner we do turnips, setting the plants out at about a foot distance, and clear out the weeds. This hoeing costs three shillings an acre, but it renders the plants much stronger than they otherwise would be, and makes them produce more seed.

If

If any part of the field miss, we fill it up with plants from the thicker part, in the latter end of October, or beginning of November, which answers much better than transplanting them in January; for in the latter case, should a sharp frost succeed, they would be mostly killed from not being rooted; otherwise the severest frost in this climate will not injure them.

The produce is from three to six quarters per acre, and the price last year was from twenty to twenty-two pounds per last.

The plants when young are in great danger from slugs, who prey on them voraciously. The best way of preventing this is to strew over the plants a mixture of slaked lime, and wood-ashes; ten bushels of lime, and fifteen of ashes, are enough for an acre. This not only destroys the insects, but promotes the growth of the crop greatly, so that it gets to a strong head before winter.

In the month of September, we cut and thrash it on a floor made in the field, and covered with a large cloth or waggon-tilt. The straw and chaff are burnt for the sake of the ashes; but  
sometimes,



sometimes, when the stalks are very strong, we use them for inclosing fences in our farm-yards, to protect the cattle from winds in winter.

The idea that rape impoverishes the soil seems to be a mistaken one; for we get very good crops of wheat after it. This plant should not, however, be sown two years together on the same land. It always does best after beans, turnips, or cabbages.

Most of our farmers let the reaping, thrashing, dressing, and putting the seed up for market, together with making the floor, at six-pence per bushel; and when the crop is good, the men make great wages of it at that rate.

If the seeds are large, black, and free from red ones, we reckon it good. If the crop be kept long before it is sold, it should be laid very dry, otherwise it will lose its colour, and be much damaged.

Some of our farmers sow rape-feed merely for the sake of the winter-feed it affords our cattle. It is the most fattening of any winter-feed for sheep. They will thrive more on rape-feed plants  
in

in one month, than on turnips in two, if put in soon after Michaelmas. In this case, when the crop is fed off, we plough it up early in the spring, and always have a good crop of barley. But this method is not generally practised; for it requires great care and pains to clear the land of the rape-feed plants, which would, if not destroyed, soon grow up above the barley, and injure the crop. And besides, whenever rape-feed is at a tolerable price, it is not making the most of it to feed it off.

There is one thing to be observed in ploughing for rape, which in general is little attended to; and that is, when you plough for sowing, plough north and south, if your field will admit of it; and then the land when sown will lie full faced to the sun, and receive a greater share of its influence.

The greatest inconvenience that attends this plant is, that its straw is neither good for stover or manure; but we burn it into pot-ash to tolerable profit.

If these few hints prove in any degree satisfactory, it will give pleasure to

Your's, &c.

Birch, near Colchester.

J. B.

ARTICLE

## ARTICLE XXI.

*On the Cultivation of Burnet.*

[From a Correspondent in Kent, to the Secretary.]

S I R,

Jan. 15, 1783.

YOUR letter of December 20, reached me in due course, wherein you inform me that Burnet is a grass but little cultivated in Somersetshire, and request my thoughts on its usefulness. I shall at all times be happy in communicating any thing that may tend to promote the views of a Society established on so liberal a plan as that of Bath; and therefore it is with pleasure that I comply with your wishes, so far as the knowledge of the subject will admit.

Burnet is not generally cultivated in this county; but some of our most intelligent farmers have raised it of late years with considerable success.

I apprehend that one principal cause of its not having been more attended to, is the goodness of our soil, which will produce other crops that in general pay better than Burnet. But this

is a reason which ought not to operate in countries which abound with poor land, to which this plant is better adapted than many others.

The cultivation of this grass is attended with one principal advantage, besides that of not requiring a rich soil; which is, that it proves an excellent winter pasture when hardly any thing else vegetates.

I might indeed mention several others; to wit, It makes good butter. It never blows or swells cattle. It is fine pasture for sheep; and will flourish well on poor, light, sandy, or stony soils, or even on dry chalk hills.

The cultivation of it is neither hazardous nor expensive. If the land is prepared as is generally done for turnips, there is no danger of its failing. After the first year, it will be attended with very little expence, as the flat circular spread of its leaves will keep down, or prevent the growth of weeds.

On the failure of turnips, either from the fly, or the black worm, some of our farmers have sown the land with Burnet, and in March following had a fine pasture for their sheep and lambs.

It

It will perfect its feed twice in a summer; and this feed is said to be as good as oats for horses; but it is too valuable to be applied to that use.

It is sometimes sown late in the spring with oats and barley, and succeeds very well: But we mostly sow it singly in the beginning of July, when there is a prospect of rain, on a small piece of land, and in October following, transplant it in rows two feet apart, and about a foot distant in the rows. This is a proper distance, and gives opportunity for hoeing the intervals in the succeeding spring and summer.

After it is fed down with cattle, it should be harrowed clean. Some horses will not eat it freely at first, but in two or three days they are generally very fond of it. It affords rich pleasant milk, and in great plenty.

A gentleman farmer near Maidstone some years since sowed four acres as soon as the crop of oats were got off, which was the latter end of August. He threw in twelve pounds of seed per acre, broadcast; and no rain falling until the middle of September, the plants did not appear before the latter end of that month. There was however a

good crop, and in the spring he set the plants out with a turnip-hoe, leaving them about a foot distant from each other. But I prefer the drill method, as it saves more than half the seed. The land was a poor dry gravel, not worth three shillings an acre for any thing else.

The severest frost never injures this plant; and the oftener it is fed the thicker are its leaves, which spring constantly from its root.

With respect to the drill husbandry, it is much on the increase with us both in wheat and turnips, and succeeds to admiration. Many of our best farmers adopt the Norfolk method, and hoe between the rows, which is found so advantageous, that it must certainly in time make its way over the whole kingdom.

We often sow turnips between the rows of drilled beans, which succeed well, as the beans do not check their growth.

I am, Sir,

Your most obedient servant,

H. D.

ARTICLE

## ARTICLE XXII.

*Cultivation of Madder recommended.*

[In a Letter from a Gentleman in Dorsetshire.]

GENTLEMEN,

**B**EING a sincere friend to your institution, I beg leave to communicate a few thoughts on your premium for the cultivation of Madder; which I think is a very just one, for two reasons.

*First*; It is certainly consistent with true national policy, to cultivate every thing consumed either in food or manufactures, to which our soil and climate is favourable. And *secondly*, because Madder, while it yields a considerable profit to the planter, cleans and meliorates the soil in a remarkable degree.

The vast sums annually paid to the Dutch for this article, proves the necessity, in point of sound policy, that we are under of raising it at home. The too commonly received idea, that we cannot equal the Hollanders in this branch of agriculture, is erroneous. It has indeed been proved totally false by the successful experiments of Mr. Ar-



buthnot, who carried it to the greatest perfection, with much advantage to himself, as well as to the publick.

There is a certain degree of indolence, not to say prejudice, among the farmers in general, with respect to every thing out of their common line of practice, and especially with respect to matters on which trials have been unsuccessfully made. This has been strikingly displayed in the articles under consideration. About sixteen years since, the London Society offered a premium of five pounds an acre, on all land planted with Madder. This, it was expected, would have rendered the cultivation of it general; but the proper method of raising it being then imperfectly understood, the experiments of a few persons failed, and this so far discouraged others, that little further progress was made in this important article of consumption. The farmers could not, or at least would not, see the difference between a crop failing through *improper management*, and through a natural unfitness of soil or climate, which would in all cases operate against it.

But Mr. Arbuthnot was not weak enough to be governed by this mistaken prejudice. He saw  
what

what the errors were which had occasioned some of the planters of Madder to be unsuccessful, and determined to avoid them by undertaking it on a new plan, and prosecuting it with a spirit becoming its importance.

The attention he gave to every particular of soil, situation, season, manure, &c. overcame every difficulty, and enabled him to cultivate Madder with great success and advantage on soils not remarkable for their fertility. The experiments he made are faithfully recorded in Mr. Young's Eastern Tour, and I beg leave to recommend them to your consideration as a Society.

As you have very judiciously taken some land to make experiments in Agriculture upon, under the direction of your own Committee, I beg leave to propose Madder as one object particularly worthy your attention. If you cultivate it on Mr. Arbuthnot's plan, I doubt not but you will be equally successful; and that your experiments may prove of great utility in setting an example to others which they may probably be induced to follow. I beg your excuse for this liberty,

And am, your most obedient servant,

Dorsetshire,  
March 12, 1780.

J. M.

## ARTICLE XXIII.

*On the Management of Clay-Lands, and some of the Causes of the Discouragement of Agriculture.*

[By a Gentleman Farmer in Essex, to the Secretary.]

S I R,

I RECEIVED your letter, and in answer thereto, shall give you an account of the best method we have in manuring and cropping our very strong or stiff clays.

We begin by making a good fallow: What I mean by a good fallow is, to turn in the stubble as soon after harvest as an opportunity offers. In the succeeding summer plough it four or five times clean, and as deep as the soil will admit of; at least so deep as to turn up the thistle-roots, and the spear-grass, that lie in the good soil.

The second year sow barley; the third year make another good summer fallow; the fourth year sow revits, (red Lammas wheat;) and in the month of March throw in ten pounds of red clover-feed per acre; the fifth year feed it all summer with horses  
and

and sheep; the sixth year make a good fallow. You will find the poorest clays will by this method of heating them, get better without any manure.

But such clay lands as are well improved, and will bear it, we treat in a different manner. After a good fallow, we sow barley with clover, and feed the clover till the middle of June; then shut out the cattle, and feed the clover. At Michaelmas we break it up, and sow wheat, harrowing the wheat in. Where the clay-lands are good, we have found the following course of crops for twenty years do very well.

1st Year, fallow	13th Fallow,
2d, Barley with clover	14th, Barley
3d, Clover-feed	15th, Beans, or pease
4th, Wheat	16th, Wheat
5th, Fallow	17th, Fallow
6th, Barley	18th, Barley
7th, Pease, or beans	19th, Ditto. If the land be
8th, Wheat	tired with clover, sow
9th, Fallow	tares, [vetches] and
10th, Barley and clover	feed them
11th, Clover	20th, Wheat, or barley.
12th Wheat	

This

This course of crops I confine only to strong or stiff clays. The principal manure we have yet in use is town dung, and the dung that arises from farm-yards, mixed with earth dug up on the borders or under the hedges. What I wish to be understood by *clay*, is only such as is well filled with chalk-stones, whether large or small. All stiff soil, without chalk-stones, we call loam, or brick earth. These soils we mend with clay, and find the greatest improvement from it.

Now, as it appears to me that your society have a real design to encourage agriculture, I beg their candid hearing while I point out a few things by which many of the best farmers in our country (and probably in your's also) are discouraged from making many improvements which might otherwise take place.

*First*; With respect to the method of letting farms. Many Noblemen and Gentlemen of large landed property, to save themselves the trouble of examining into the real value of their estates, and of letting them properly, employ stewards to transact this business with their tenants. It frequently happens that these stewards are gentlemen brought up to the law, who have never had much opportunity

opportunity of knowing the value of land by experience, and can much better *word a lease*, than ascertain the proper rent of the estate.

These stewards, therefore, take the opportunity of letting the farms, as a jockey would sell a horse; and are always determined by the highest bidder. If an experienced farmer will not give them their price, perhaps they find a tradesman, or a young man eager to get into business, that will; and it signifies little to them who the tenant is, if they can but please their employers by raising the rent. By this means, the tenant, having taken his farm too dear, is soon ruined, and the farm is again to let.

Sometimes an old tenant, rather than be turned out, will agree to give more rent than he can afford; but after finding he cannot get forward, and is not permitted to leave his farm till the lease expires, he leaves off improving it, and makes the best he can of it with the least expence. By this means the estate itself is injured, and many of our useful labourers are unemployed, who, for want of work, enlist into the King's service, and leave their families to be maintained by the parish.

I have

I have seen divers instances, wherein by the industry of a family, in the course of a lease, a farm has been so much improved, that the old tenant at the expiration of his lease has offered a fourth more rent than he gave before, rather than be turned out; but because he would not submit to give much more rent than he could really afford, to get a decent living for his family, he has been turned out, notwithstanding he had so much improved the estate, and the farm let so dear to a stranger that it has nearly ruined him.

These few things are among the many discouragements to improvements in agriculture; and they naturally occasion a few queries relative to the subject.

I would therefore ask such gentlemen as wish to encourage agriculture,—

*First*; Whether it would not be more for the interest of those who have estates, were they to visit their tenants themselves, and to take with them one or more of the most active and experienced farmers they can find, whereby they might be well informed whether their estates are over-rented or not?

*2dly*. Whether



2<sup>dly</sup>. Whether they are well farmed or not; and if not, to point out to their tenants how they may with advantage to themselves manage for the better in future.

3<sup>dly</sup>. Whether, where it appears that a tenant is industrious and oppressed, it would not be more to his own interest to encourage him?

4<sup>thly</sup>. I would ask with all due submission, whether this would not be more likely to encourage agriculture than the present practice of screwing up rents to the highest pitch possible; or even than in introducing, at a great expence, many very ingeniously contrived implements of husbandry, many of which, though they may amuse and entertain the curious, are not adapted for use to the practical farmer?

I mean not, however, to discourage the use of such newly-improved implements of husbandry as are calculated to expedite labour and lessen expence; but such only as are merely theoretical.

I will just add, that we find the watering of meadow and pasture land attended with great advantage, and the cheapest amendment we have.

I am, &c.

\* \* \*

P——d, Essex.

ARTICLE

## ARTICLE XXIV.

*On Watering Meadows.*

**I**T having been a point much disputed, which is the best water for throwing over meadows, that which comes fresh from the springs, or that which has run a considerable course above ground, we shall give the following extracts from divers letters which have been sent to the Society on the subject, without presuming ourselves to determine on the point in dispute.

## I.

I APPREHEND that in most of the flat parts of this county hot-springs may not abound; and that in places where there are any, their virtue is not known; so that the inhabitants (without choice or consideration, in many instances) use only that water which has run some way, and is become foul by floods. But in the neighbourhood of Chard, and doubtless in many other places in the county where the benefit of good spring-water is known, it is preferred, and the farmers flood their meadows with it immediately from the springs, finding its effects so fertilizing as sufficiently

ciently to maintain their meadows in good heart, without any other aid.

Near Taunton.

R. P. A.

## II.

I SHOULD have answered your letter sooner, but wished to know the opinion of some of my friends on the subject. On enquiry, I find that their sentiments coincide with my own; and are as follow:—

That water running from a spring, or out of a rock, is often preferred to water from a river that has passed some way. I apprehend, however, that this is not always the case; but sometimes quite the reverse. Springs coming immediately from a rock, or from the earth, are, I apprehend, of very different qualities. A spring coming from a lime-stone rock, I should think by much the best for watering meadows, which is the case at Orcheston in Wilts, where that famous grass grows,\* which produces an amazing crop in those seasons when the meadow can be watered with the springs gushing out of the limestone rocks. At

\* See an account of this grass, vol. i. p. 97.

other

other times, when the springs are low, the land does not produce more than a third of the quantity.

It is understood by the farmers here, that water is very much impoverished by watering a great many meadows on the same stream; and that those meadows at the head of the stream are much the best on that account, except where there are a great number of farm-yards draining into it; which, in my opinion, makes up in part at least for the deficiency.

Maningford.

J. A.

### III.

WATER seldom, if ever, promotes vegetation, unless it be in a mixed or heterogenous state. It is therefore necessary, previous to the flooding of meadows, to examine of what nature and quality your water is. All water that passes through beds or veins of minerals, or which contain calcarous nitre, copperas, allum, &c. is highly prejudicial to grass lands. But water that issues from chalk cliffs, or limestone rocks, or sand and gravel, is in general friendly. The best test is its softness, which may easily be known.

The

The quantity of water that is let over the land should be in proportion to the nature of the soil, and the heat of the season. If the soil be sandy, gravelly, or chalky, and the declivity considerable, the more water is wanted, and it should remain the longest, especially if the weather be warm, and it be a south aspect.

If your water has run a long course above ground, the foulest is the best; but that coming immediately from chalk or lime rocks is warmest, and much to be preferred to foul muddy water in general. I must however observe, that water in a state of putrefaction is poison to vegetables, and therefore ought never to be used for this purpose.

S. B.

#### IV.

WATER when carried over meadow-lands after heavy rains, deposits a fertilizing sediment which enriches the soil, and turns the mould blackish. It also promotes the speedy putrefaction of every vegetable and animal substance found in the earth, and thereby contributes to the melioration of the soil under the sward or turf.

Care should however be taken, that the quantity of water brought on the land be only enough to give vigour to the plants without overcharging their vessels. Never water your lands in very hot weather, for when the vessels of the plants are filled, by the heat causing it to ascend suddenly, a sudden cold morning will greatly injure the herbage.

If the spring proves dry, pastures may be watered as soon as the frosty season is over. But if the winter has been severe, and the earth remains moist, no current of water should be admitted till the earth is settled, and the surface becomes dry; for the gentlest stream would carry off the fine mould loosened by the frost. After the grass shoots, and the season becomes mild, water sparingly. In the summer never water but in great drought, nor even then, unless the water be perfectly clear and sweet; for muddy water would render the grass foul, and give it a bad taste.

The best water is that from clear warm springs, and the softer the better; but if that cannot be had, brooks which are become foul by running in a muddy channel, will be the next best. For a stream which continues clear after it has run a considerable way above ground, is generally cold,  
and

and impregnated with metallic, or mineral particles, both which are destructive to vegetation.

J. F.

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V.

ON the receipt of your letter I consulted my meadow floaters, who are unanimously of the opinion, that the sooner the water is thrown over the meadows after it arises out of the springs, the more efficacious it will be.

We have no springs on the hills in this part of the country, as in the neighbourhood of Bath; but our meads are full of them, and we apply the water issuing therefrom as soon as possible to the lands. We find spring water is better for this purpose than river water, on account of its being warmer in winter, and cooler in summer.

Ramsbury.

W. J.

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VI.

I HAVE a range of meads lying nearly on a level by the side of a little river, which has run near thirty miles before it reaches my lands. And in the upper part of my meadows a spring rises of

L 2

very



very clear soft water. Being desirous of proving which would be most beneficial to the land, I have divers times in different years tried both.

In a wet winter, I can easily, at flood-time, when the river is very foul and muddy, float all my meads by opening the bank by the river side. This I have done several times, and a great deal of sediment has been left behind on the retiring of the water. In this case, I have generally had a large crop of grafs the succeeding summer, but I have always found it ranker, and the hay less sweet, than at other times.

When I have turned the water of my spring over the land, I have found the produce equally great, and the hay much finer and sweeter than in the other instance. I have also observed, that those meads which first received the water from the spring, were most luxuriant; and those which it ran over last the least so. I am therefore of the opinion, that the best and most fertilizing water for meadow-land, is that which issues immediately from warm soft springs.

W. M.

The following very ingenious letter on this subject we give entire.—

DEAR

## VII.

DEAR SIR,                      Woolhampton, Jan. 22, 1783.

I ESTEEM myself much honoured by the notice the gentlemen of your Society have been pleased to take of my poor, but very willing endeavours to add my mite to promote the views of their very useful institution.—To your present questions,

*First*; “What kind of water have you found most efficacious?” &c. I answer, That which has first ran a considerable way as a brook or rivulet, or rather as a large and rapid river.

I formerly occupied some water-meadow not many miles distant from this place, where there is a great deal of land watered from the Kennet, a very considerable river which rises at a village of that name not far from Marlborough. The occupiers of those lands are uniformly of opinion, that the more thick, turbid, and feculent, the water is, the greater will be the benefit to be derived from the use of it: And the opinion is certainly well supported both by reason and experience. Hasty showers, and very heavy rains, dilute the manure, and wash away the fine pulverized earth from the adjacent lands for many miles around; so that as the waters increase, and

become more rapid, they also become more replete with fertilizing matter, as is visible to the eye by the quantity of scum, mud, and fine earth, remaining on the surface when the water is drawn off. The benefit derived from flooding may in general then be computed, *ceteris paribus*, from the quantity of feculent matter deposited by the water, for it is, I believe, invariably found to be in proportion thereto.

*Secondly*; “Is the water of land-springs?” &c. I apprehend no certain particular answer can be given to this general question.

The effects of the water of land springs must depend upon the nature of the strata through which it passes, and may be beneficial or otherwise to vegetation, as that might be if applied in substance. Calcareous earths, in general, are friendly and conducive to vegetation; and from thence it seems probable, that water issuing from limestone-rocks, would promote the growth of vegetables in proportion to its impregnation by the calcareous matter.

The effects of limestone-water have never fallen within my observation; but from what I have  
observed

observed of land-springs, I have often thought the benefit from them was nothing more than from the simple fluid as a constituent part necessary to the accretion of all bodies, abstracted from every principle of nutriment but what is contained in water as such only.

However, there cannot be a doubt, but different springs are impregnated with different qualities, the particulars of which cannot be known but from observations of their effects.

*Thirdly*; “Which ever is preferred, or found best, why is it so?” &c. The answer to the first part of this question is contained in the answer to the first question. It is so, because it supplies more copiously that matter or substance which is the pabulum, or food of plants, and what is the *material* support of vegetation, without which it would as necessarily cease, as an animal would die without food.

And, *4thly*; “What is the *modus operandi* of the benefit arising from the floating of meadows?”

Perhaps this question, strictly and philosophically speaking, is as little capable of a satisfactory

answer, as, What is the essence of matter, or that substance which supports its extension, solidity, figure? &c. That heat and moisture are the *sine qua non* of vegetation, is abundantly manifest; for it is universally certain, that neither feeds nor roots, if kept *perfectly* dry, will ever vegetate; and if kept wet without heat, they corrupt and rot, but never grow.

Heat and moisture, therefore, are two universal agents indispensably necessary to the life and growth of plants; but how far either or both supply the principles or material substance which causes the accretion, and increase of bulk and size, or by what mode of operation it derives principles from dead, inert, stinking, corrupted, and impure substances, and converts them into parts of living organized bodies, which charm the sight, the smell, and the taste of animals, and furnish aliment for their comfortable subsistence, is, perhaps, beyond the utmost stretch of human understanding to conceive.

It is in every one's experience, that the excrements, and corrupted substance of animals, when properly digested, are the most powerful promoters of vegetation; and plants so produced  
become

become the wholesome and necessary support and food of man: So that what was last year a poisonous, putrid mass, is this, by the wonderful chemistry of nature, and a rapid circulation thro' a system of organized bodies, converted into a substance endued with life, sensation, &c. If that should be doubted, they certainly are necessary to the support of life, sensation, &c. And perhaps it is not a jot more conceivable how a poisonous, putrid substance, should be converted into wholesome nourishment for the support of living animal substance, than it is for the former to be converted into the latter; that is, a dead, inert substance, into a living and active one.

By creation is commonly meant the production of something out of nothing; or the calling of something into being which had no existence before. But by propagation and generation, is meant the existence of some being as derived from another. But is such generation any thing more than a real transmutation of one thing into another? Every cherry-stone virtually contains in it more of those trees, and of that fruit, than ever existed together at any one time in the world. Is it possible to conceive, that the seminal principle of the kernel substantially contains such an infinity?

infinity? What then, but extraneous matter, under a very different heterogenous form, being circulated through a system of pipes of organized matter, can produce such an infinite number, and immense magnitude, of any class of living beings, from a principle originally too minute to be visible to the eye?

The earth may be conceived to be the matrix of vegetation; and the husbandman certainly knows from experience, that by impregnating it with certain substances, by laying them upon it at proper seasons, a soil naturally sterile may be rendered fertile. So a meadow floated with water, copiously abounding with putrescent particles, and substances impregnated therewith, would infallibly be benefited thereby; the *modus operandi* of which may literally, though in a gross sense, be certainly imputed to the action of the fertilizing matter deposited by the water in the form of an unctuous sediment, in the same manner as all lands are benefited or improved by the accession of manure, by whatever means it is deposited there.

I am, dear Sir, with great respect and esteem,

Your most obliged servant,

JOS. WIMPEY.

ARTICLE



## ARTICLE XXV.

*On Rearing Calves without Milk.*

S I R, H—l, April 24, 1783.

LOOKING into the premiums offered by the Society this year, I find the eighteenth is a Silver Cup, value six guineas, to the farmer who, from January 1783 to January 1784, shall rear the greatest number of calves, not less than five, without milk; and who shall discover to the Society the best and cheapest method of so rearing them.

Such a discovery being a desideratum in husbandry, and valuable as a likely means of causing a greater number of those profitable animals to be annually reared ; I have lately, I hope, been furnished with that information, which will bid fair fully to attain the end proposed, as much from the very great facility of the practice, as from the cheapness of it.

Riding out a few weeks ago, I accidentally passed through a turnip-field, in the occupation of a tenant of mine, in Wreningham, (a parish adjoining to this) where seeing several fine healthy weanling

weanling calves, of this year, I enquired of him, who then happened to be there, how long they had been turned into the field, and whether they were left abroad during the night; when he gave me the following account :—That his method was, and had been for many years, to wean his calves from sucking the cows at about seven or eight days old; that he then gave them skimmed milk for about ten or twelve days more, with a few turnips cut into three or four pieces each, which they soon learnt to nibble and eat; after which, he turned them into the turnip-field without any farther care or trouble than carrying them a small bunch of fresh barley or oat-straw, night and morning, which he always observed to lay under such hedge of the field as was then most sheltered from the wind; that he turned them out in any month, in January, or sooner or later, as they happened to be calved; that he never lost any of them, never had any of them lousy, or that seemed to require more care or attention about them.

This practice was so different from my own, and that of most of my neighbours, that I enquired of some of them into the truth of it, when they all assured me, that the fact was as I have represented, although they had not the courage  
to

to follow his example; and that this man had learned the practice from a former tenant of mine who lived in this parish, and did the same, with this difference only, that he used to carry to his calves, whilst in the turnip-field, a quantity of chopped straw of either barley or oats, which he gave them in a trough night and morning until they went to grafs.

I cannot, upon the joint testimony of these people, have any doubt of the truth of these facts; and admitting them therefore to be true, there cannot, I conceive, be any method of rearing calves attended with either less trouble or less expence to their owners, and which deserves to be more generally known.

I am, Sir, your most humble servant,

T. B.

#### ARTICLE XXVI.

*On the amazing Increase Grain is capable of, from dividing and transplanting its Roots.*

SIR,

I TAKE the liberty of writing to you as Secretary to the Bath Society for the encouragement of Agriculture; and having this day with  
great

great pleasure perused the publication of their letters and papers, I am impelled to throw in my mite, by communicating an idea, with which I am most forcibly impressed.

If you will take the trouble to refer to the Annual Register for 1769, you will find, under the head of useful projects, a paper extracted from the Philosophical Transactions, giving an account of an experiment made by Mr. Charles Miller of Cambridge, on the increase of a single grain of Wheat in one season. It was communicated by Dr. Watson, of Lincoln's-inn-fields.

I have applied to the Doctor to know if the experiment was made on a larger scale the succeeding year, as was proposed? He informed me, "that he believed it was not; that Mr. Miller went to India soon after that experiment, and that he knew nothing more on the subject than has been published in the Philosophical Transactions."

Mr. Miller has been employed by the India Company to make researches into the Botany of the East; and I am persuaded, the result will be very entertaining to such Botanists as delight in the

the study of exotics; but I will venture to affirm, that the single experiment upon the grain of wheat (if properly attended to) will prove of more real and intrinsic value to this country, than all the exotics, or than all the knowledge of exotics, he can possibly import.

I am fully sensible, that the expence and labour of setting wheat, in the manner as described in that paper, will render it impracticable in common use; but I still think, it is a most important and valuable discovery, and that it merits the utmost degree of the attention of such a patriotic and public-spirited Society as is established at Bath.

One single grain of wheat produced in one  
season, in weight forty-seven pounds,  
in measure  $3\frac{1}{2}$  pecks,  
in number 570,000-fold!

What an astonishing increase! What a power of fecundity! What an incredible divisibility, almost *ad infinitum*, are all hereby laid open!

I am now inclined to believe, after this discovery, it may be found, that wheat may be produced from

from a fibre of the root, as well as from a plant. I am not a farmer; I never had the direction of a plough; but I will make the experiment, to try what is the smallest portion of a plant of wheat, that can be made to produce grain.

Mr. Miller, after having made the discovery, was satisfied with publishing it; but I promise you, if *I* am so happy as to make any new discovery upon the subject, I will not (like him) leave it to others to point out how, or in what manner, it can be applied to public utility.

But I forget myself. I am giving up facts, and following conjectures. I will therefore return to the original intention of my letter, which is, to excite the attention of your Society to this wonderful discovery of Mr. Miller's, in hopes that, under your patronage and protection, it may be rendered useful to the improvement of husbandry.

By this experiment, we have obtained the most clear and incontestible proof of the fecundity and divisibility of wheat; it therefore remains, to follow the most probable means, the means that may bid the fairest for improving upon this principle, and making it applicable to the practice of farming.

farming. I agree with the Author who begins your Appendix, "that nothing can be expected from it in the hands of common farmers;" from them we shall have, "*It may be so, but I don't know.*" But from such a Society as your's, I expect every thing.

Where men possess liberal ideas, and a great share of public spirit, it cannot be supposed they will despise a hint, and treat it with contempt, merely because it is suggested to them by a person who is not a farmer by profession. I may indeed say, not even in theory, for I never read any book on the subject of agriculture, excepting that of the Bath Society; but within this month, I have become such an enthusiast in the doctrine and principles of the divisibility of grain, after it is sprung up, that I can think upon no other subject; and since my conversion to this doctrine, I have been at the pains to procure some information from practical farmers, in hopes thereby to enlarge the very narrow and contracted circle of ideas I have on that subject.

I have learned from them, that it is not unusual in some parts of the country, for the farmers to harrow their fields after the grain is sprung up. In



Norfolk, they harrow their summer corn, but not their wheat. In Essex, they harrow their wheat, but not their summer corn.

Upon investigating the principles upon which these practices are founded, I found them confined merely to that of pulverizing the earth, without any attention to Mr. Miller's doctrine: They said, "that after very heavy rains, and then  
 "excessive dry weather, the surface of their lands  
 "were apt to be caked, the tender fibres of the  
 "young roots were thereby prevented from pushing, and of course, the vegetation was greatly  
 "obstructed; in such instances, they found very  
 "great benefit from harrowing and rolling."

My own reason tells me *their* principles are well founded, so far as relates to pulverizing; but I contend, that the benefit arising from harrowing and rolling is not derived from pulverizing entirely, but also from subdividing,\* and enabling the  
 plants

\* We doubt not the good effects of harrowing and rolling both wheat and summer corn, for the very good reasons given by the Norfolk and Essex farmers for their practice. But we apprehend, that with respect to the harrows dividing the roots of the plants when they begin to *tiller*, our ingenious correspondent is too sanguine in his expectations. The teeth of a harrow are too large and blunt to

plants to tiller, (as I believe it is termed.) The harrow certainly breaks the incrustation on the surface, and the roller crumbles the clods; but it is also obvious, that the harrow removes a great many of the plants from their original stations; and that if the corn has begun to tiller at the time it is used, the roots will be, in many instances, subdivided, and then the application of my system of divisibility comes into play. The roller then serves to plant the roots, which have been torn up by the harrow. Such is my enthusiasm, that I am induced to establish this hypothesis, and leave it to the consideration of gentlemen who are conversant both in the theory and practice of agriculture.

It is true, indeed, that many systems, which make a good figure in theory, fall to the ground when reduced into practice, and are put to the test by the austere hand of experiment.

to divide roots so small and tenacious as are those of grain; and whenever such roots (however tillered) stand in the line any tooth makes, they will, if small, be only turned on one side by the earth yielding to their lateral pressure, or if large, the whole root will probably be drawn out of the ground. In our opinion, therefore, the principal uses derived from harrowing and rolling these crops are, opening the soil between the plants, earthing them up, breaking the clods, and closing the earth about their roots.

I hope, in the present instance, that will not be the case. My argument is founded upon analogy, upon purity of reasoning. One grain of wheat is capable of producing, in one season, one bushel; [Mr. Miller, indeed, insinuates, that it might have been greater;] one hundred grains then contain the capability of producing a larger crop than ever was reaped from one acre.

But it will be objected to me, that Mr. Miller's practice cannot be extended to a large scale. I allow it; not by the hand, I mean; but I will not give up the harrow and roller, until some better implements are invented.

In common, it is not a very material object to save a proportion of the seed corn; because probably it can only be done by increasing the labour, which may greatly overbalance the value of the seed to be saved.\* This season, however, it becomes an object of the greatest importance; in the Northern parts of this kingdom, there is a very great scarcity of corn fit for feed; the harvest was so late the corns did not ripen, and of course, a great deal of bad seed will be reaped; if so, when the corn springs, it must be very thin,

\* This is not the case in drilling; the extra expence is much more than saved in the seed.

puny, and probably diseased. This then is the æra for applying the harrow and roller to great advantage, upon fields which are not very promising. If the farmer is satisfied with the appearance of his crop, after it is sprung, I do not prescribe—it is only when people are sick that they apply to a doctor.

I do not presume to recommend any thing more at present, than the use of the harrow and roller, from which the farmers in Norfolk and in Essex derive so much advantage. (They may be used in many other counties, but it is not yet come to my knowledge.) I will, however, venture to recommend a repetition of them; that is to say, if great advantage is observed on harrowing and rolling once, that some time afterwards, when the roots have had time to strike into the earth, and the corn to tiller, it should be again harrowed and rolled; and if good effects are observed from that also, that it should even be repeated a third time. I recommend it upon the following principle: That Mr. Miller's experiment demonstrates how difficult it might be to eradicate corn by harrowing; should nine plants be destroyed by the harrow, it is probable, that the tenth will do more than supply the deficiency.

I come now to conclude, with the following maxims:—

*First*; That this discovery of Mr. Miller's is highly meritorious, and deserves the attention of your Society, and of every Society for the improvement of Agriculture, as well as of every Farmer in the world.

*2dly*; That every farmer who practises harrowing and rolling, should pay particular attention, in the most minute manner, to the effect it has on the corns; and to observe particularly, whether in his judgment the benefit arises from the pulverizing, or the tillering, or from both;—that he should ascertain by experiments on certain portions of his lands, accurately measured, the difference in the produce of what is not harrowed and rolled, and what is done once, and (if he chooses it) let him try it on the second, third, and even the fourth time. Upon a small scale, the loss cannot be great, even although the repetition should not succeed; but if it should answer, the discovery may be very important, perhaps more so than any that has been made in agriculture for this century.

*3dly*; That

3dly; That if the ideas of the Bath Society should coincide with mine upon this subject, they ought to take the most speedy and effectual measures to make their approbation public, so as that the practice of harrowing and rolling corn after it is sprung, may thereby the sooner become general; and that they should invite every person who may have already followed that practice, or who may do it in future, to communicate to *them* their experiments, their observations, and their opinions, of the advantages or disadvantages resulting therefrom.

4thly; That they should also invite some of the most ingenious Botanists to follow up the experiment, so successfully begun by Mr. Miller upon wheat, and also to extend it to oats, barley, rye, buck-wheat, &c. &c.

5thly; That as it is very material to know the most proper time to harrow and roll corn, in respect to its age, or its height, as well as in respect to the seasons, whether in wet or dry weather; measures to procure information on those heads should be adopted.

6thly, and lastly; That as the knowledge of the particular sorts of harrows and rollers now in use

for this operation may be material, measures should also be taken to procure information on that head. And farther, that, as it is very probable great improvements may be made in regard to implements fit for this operation, considerable premiums should be offered to the inventors of such as may be found on trial to be the best adapted for this purpose.

I have the honour to be, Sir,

Your most obedient servant,

London, April 20, 1783.

R. B.

N. B. As the experiment referred to was very extraordinary, we shall give an abstract of the account, as published in the Philosophical Transactions for the year 1768.

ON the 2d of June 1766, Mr. C. Miller sowed some grains of the common red wheat; and on the 8th of August a single plant was taken up and separated into eighteen parts, and each part planted separately; these plants having pushed out several side-shoots, by about the middle of September some of them were then taken up and divided,  
and



and the rest of them, between that time and the middle of October; this second division produced sixty-seven plants. These plants remained thro' the winter, and another division of them, made between the middle of March and the 12th of April, produced five hundred plants. They were then divided no further, but permitted to remain. The plants were in general stronger than any of the wheat in the fields. Some of them produced upwards of one hundred ears from a single root. Many of the ears measured seven inches in length, and contained between sixty and seventy grains.

The whole number of ears which, by the process above-mentioned, were produced from one grain of wheat, was 21,109, which yielded three pecks and three quarters of clear corn, the weight of which was 47 lb. 7 ounces; and from a calculation made by counting the number of grains in an ounce, the whole number of grains was about 576,840.

By this account we find, that there was only one general division of the plants made in the spring. Had a second been made, Mr. Miller thinks the number of plants would have amounted  
to

to 2000 instead of 500, and the produce thereby much enlarged.

The ground was a light blackish soil, upon a gravelly bottom; and consequently a bad soil for wheat. One half of the ground was well dunged, the other half had no manure. There was however not any difference discoverable in the vigour, or growth, or produce, of the plants.

#### ARTICLE XXVII.

##### *On the Quantity of Seed-Grain unnecessarily sown in the Broadcast Method.*

[By a Gentleman Farmer in Hertfordshire.]

GENTLEMEN,

THE obliging notice you took of my former letter encourages me to address you a second time, but on a different subject; to wit, that of the quantity of seed-grain unnecessarily sown in the broadcast method. This is too much overlooked by farmers in general, who, though when told of it, admit the fact, but neither see it nor its consequences in their full magnitude.

When

When the seed is to be prepared or carried to the land for sowing, they too generally think that the more they sow the more they shall reap; and therefore, in most places, are at double the expence for seed grain, which they need to be, without making any further calculation, than that of the difference of value between 6 and 10 pecks per acre, on the single field they are about to sow.

One reason for this may be, that the farmers' seed grain being their own growing, they consider it as the old woman did her flour, when she calculated the cost of her mutton-pies, and overlook its real value. *The flour is my own*, said she; *the seed is my own*, says the farmer, and therefore I won't starve the crop.

But if large farmers would be at the trouble of calculating the value of what they unnecessarily sow on two or three hundred acres of arable land, the amount would astonish them; for it is really astonishing, and an object of very great national importance; indeed so great, that I am of the opinion the Parliament would be wisely employed in instituting a Board of Agriculture, to regulate this and other abuses of the art.

It is a certain fact, that double the necessary quantity of feed-grain is annually thrown away ; which, upon a moderate calculation, would feed near an eighth part of the inhabitants of this kingdom. This of course advances the price of what remains one-eighth ;—a heavy tax indeed on the poor, and a very foolish one, because it answers no good end.

One of the great advantages of the Drill-Husbandry is the saving of feed : But from a variety of causes, some real ones in local situations, and many imaginary ones, it is not probable it will, in our time, be universally adopted. It however affords a profitable lesson to those who do not practise it. They are thereby convinced, that a much less quantity of feed than they have been accustomed to sow is sufficient. This has operated on some intelligent farmers, who still continue in the broadcast method. Some of them have taken the hint, and lessened the quantity of their feed : Their crops have been equally good or better than before. In time, perhaps, their practice may be generally better regulated. It is an event much to be wished, and I think it an object worthy your strongest recommendation.

I am

I am not ignorant that no certain standard can be fixed for the quantity of grain which ought to be sown per acre: This must differ as the circumstances differ that attend it. The soil, the season, the state of the land, and the size of the grain, require more or less, as these are different.

For instance: Wheat, a very rich fertile soil, in good tilth, requires less seed by one third than a poor hungry one: This may appear paradoxical to those who do not reason on the matter. They will say it is unreasonable to suppose a poor soil will support a greater crop,—granted; but I make no such supposition. The case is this: In a rich fertile soil every root produces much the greatest number of stalks, perhaps ten or twenty; while those in a poor soil have only two or three. In the one case, if you sow more seed, the ground will be overstocked with plants, which will draw each other up weak, and produce much straw indeed, but little corn. In the other case, if you sow only the same quantity of seed on poor land, it will be understocked, and the crop small. For if, through the poverty of the soil, a root of wheat cannot extend its side fibres more than two or three inches round, what good purpose can it answer to have them a foot apart? Half the  
ground

ground is lost. Hence it follows, that a double quantity of seed is wanted on poor land;—and therefore, that on such land the broadcast mode of sowing is preferable to drilling.

It appears clearly evident to me, that on such land two bushels, or even ten pecks of wheat, and three bushels of barley, and four of oats, may be necessary. But on a rich fertile soil, well prepared, half the quantity is fully sufficient, and will produce a better crop. Every one who attends to the growth of plants, knows that they require a competent distance to arrive at perfection. Every gardener is perfectly acquainted with this, and acts accordingly. Why then are farmers so absurd as to think the same management is not equally necessary in a field, which is only a large garden? This must be only long-rooted prejudice: For corn of all kinds must have sufficient room according to its size, or you deprive it of the advantages which nature affords, by excluding the sun and the fresh air from the bottom of the plants, which are so necessary to their perfection; and instead of corn get only a great burden of straw.

With respect to sowing wheat, the quantity of seed should be proportioned to the season. If you  
sow

sow in September, *a third less* will do than when sown in November or December, because more of the seed miscarries in that unfavourable season.

I am, Gentlemen,

Your's, &c.

X. Y. Z.

ARTICLE XXVIII.

*On the Nature and Effects of Lime as a Manure.*

[From a Gentleman in Devonshire.]

GENTLEMEN,

AS you are about to oblige the publick with a second volume of your valuable papers on Agriculture, I hope you will not deem it impertinent in me to throw a few hints before you on the nature and effects of lime as a manure for land: They are the united effects of my own experiments and observations on the subject; and the opportunities I have had for forming my opinion have been many and various.

The county of Devon has been reproached by some writers as being a century behind most counties



counties in England in Agricultural improvements. That the farmers in general here have been very dilatory in discovering, and even adopting, new improvements therein, is too true; but with respect to the nature and use of lime, they appear to understand it as well as the farmers of any county whatever. This may furnish some apology for my troubling you with the following remarks.

Lime, like most other manures, has been used in different places, and by different persons, with various success: Some have declared they never could reap any benefit from its use; but a far greater number have found its effects very beneficial, indeed more so than any other manure.

But the great error of those who disclaim the use of lime has been, that of using it on all kinds of land without distinction; vainly expecting the effects would be equally advantageous in all cases. But while it has proved a very useful good dressing to some lands, it has rendered others less fertile; and in such cases the whole expence has been thrown away.

In some parts of this county, a good manuring with lime has cost the farmer near four pounds an  
acre.

acre. It must be a better crop of wheat than they get in common to answer that expence; their profit therefore must arise from the succeeding crops.

Experience teaches that lime strongly attracts and absorbs moisture, and is itself soluble in it. In common with all absorbent earths, it also attracts oil and acids.

The most rational theory therefore is, that its virtue consists not in itself, but in its action and powers of attraction; by attracting the moisture of the air, and the oils that are floating therein, and in the earth also, and reducing the buried roots, vegetables, moss, &c. which it happens to be mixed with, into a saponaceous mucilage, which is of a very nutritive quality. It combines those substances which of themselves would never unite, such as, oil and water, which it forms into a smooth consistent fluid.

Hence it appears, that lime ought not to be used alone, except where there is plenty of vegetable or animal substances for it to act upon. When these are wanting, mix it up with rotten dung, for without these it will, in many cases, exhaust the soil of its most fertile juices and parti-

cles, and leave it in a barren state. Where there is plenty of vegetable or animal substances for it to act upon, lime may be used to considerable advantage; and also on land over-run with weeds, as it kills and converts them into good manure. But on exhausted, or very poor land, the expence of liming will never be repaid.

The learned and ingenious Dr. Alston observes of lime, that if long exposed to the air, it soon loses its medicinal virtue, its virtue as a manure, and as a cement in building; but that if slaked with water, it retains these virtues a long time. The practice of the Devonshire farmers corresponds with this doctrine.

After their lime is laid in small heaps on the land, they cover it with earth till the coat is thick enough to secure it from air and rain; and in order to prevent those from entering, they beat the outside of the heaps smooth with their shovels. The moisture of the earth gently flakes this lime, and the heaps remains in this state until the land is ready for its spreading.

Another method of mixing up their lime is used by the best farmers, which adds greatly to the fertility of the land dressed with it. This  
method

method is to form heaps of earth and lime as above described, and when these are well incorporated, to open the heaps and bury in each as much good farm-yard dung as it will cover.

The dung being thus covered up will soon ferment and dissolve; and after lying a proper time, the mass being chopped together with the spade, forms a soapy mucilaginous manure of the most fertilizing nature. Used in this manner, lime will always be exceedingly profitable. But the reason of its being reprobated in some other counties is, that they know not how to (or will not) apply it properly. Their method is to spread it on the land as they do chalk, and let it lie there till rains or the moisture of the air flakes, and occasions it to fall in pieces. But by being thus exposed to the air, its virtue, which should promote vegetation, is all evaporated, and of course its use as a fertilizing manure is totally lost.

I am, your's, &c.

C. H.

## ARTICLE XXIX.

*On the Nature of different kinds of Soil, and  
the Grain, Pulse, or Grasses, proper to each.*

[By an Experienced Correspondent.]

GENTLEMEN,

AS the publication of your first volume of select papers did you honour as a Society, and furnished the public with a variety of useful information, it gave me pleasure to see, in the advertisement of your annual meeting, that a second volume was nearly ready for the press. And as you seem desirous to obtain the correspondence of those who have had some experience, and possess some knowledge in the arts of cultivation, I am willing to contribute my mite in this way.

Agriculture, Planting, &c. have been my employment, study, and amusement, near forty years; and as I have kept regular minutes of the experiments I made, they have supplied me with considerable instruction.

I therefore beg leave to trouble you with a few brief remarks on the nature of different soils,  
and

and the crops most likely to succeed on each respectively.

*First*; Clay, which is in general the stiffest of all soils, and contains an unctuous quality. But under the term clays, earths of different sorts and colours are included. One kind is so obstinate, that scarcely any thing will subdue it; another so hungry and poor, that it absorbs whatever is applied, and turns it into its own quality. Some clays are fatter than others, and the fattest are the best; some are more soft and slippery. But all of them retain water poured on their surfaces, where it stagnates, and chills the plants, without sinking into the soil. The closeness of clay prevents the roots and fibres of plants from spreading in search of nourishment. The blue, the red, and the white clay, if strong, are unfavourable to vegetation. The stony and looser sort are less so; but none of them are worth any thing till their texture is so loosened by a mixture of other substances, and opened, as to admit the influence of the sun, the air, and frosts. Among the manures recommended for clay, sand is of all others to be preferred; and sea-sand the best of all where it can be obtained: This most effectually breaks the cohesion.

The reason for preferring sea-sand is, that it is not formed wholly (as most other sands are) of small stones; but contains a great deal of calcareous matter in it, such as, shells grated and broken to pieces by the tide; and also of salts. The smaller the sand is the more easily it penetrates the clay; but it abides less time in it than the larger.

The next best sand is that washed down by rains on gravelly soils. Those which are dry and light are the worst. Small gritty gravel has also been recommended by the best writers on Agriculture for these soils; and in many instances I have found them to answer the purpose.

Shell marle, ashes, and all animal and vegetable substances, are very good manures for clay; but they have been found most beneficial when sand is mixed with them. Lime has been often used, but I would not recommend it, for I never found any advantage from it singly, when applied to clays.

The crops most suitable for such lands are, wheat, beans, cabbages, and rye-grass. Clover seldom succeeds, nor indeed any plants whose roots require depth, and a wide spread in the earth.

*adly*; Chalk;



*2dly*; Chalk ;—Chalky soils are generally dry and warm, and if there be a tolerable depth of mould, fruitful; producing great crops of barley, rye, pease, vetches, clover, trefoil, burnet, and particularly saintfoin. The latter plant flourishes in a chalky soil better than any other. But if the surface of mould be very thin, this soil requires good manuring with clay, marle, loam, or dung. As these lands are dry, they may be sown earlier than others.

When your barley is three inches high, throw in 10lb. of clover, or 15lb. of trefoil, and roll it well. The next summer mow the crop for hay; feed off the aftermath with sheep; and in winter give it a top-dressing of dung. This will produce a crop the second spring, which should be cut for hay. As soon as this crop is carried off, plough up the land, and in the beginning of September sow three bushels of rye per acre, either to feed off with sheep in the spring, or to stand for harvest. If you feed it off, sow winter vetches in August or September, and make them into hay the following summer. Then get the land into as fine tilth as possible, and sow it with saintfoin, which, with a little manure once in two or three years, will remain and produce good crops for twenty years together.

*3dly*; Light

3dly; Light poor land, which seldom produces good crops of any thing till well manured. After it is well ploughed, sow three bushels of buckwheat per acre, in April or May: When in bloom, let your cattle in a few days to eat off the best, and tread the other down; this done, plough in what remains immediately. This will soon ferment and rot in the ground; then lay it fine, and sow three bushels of rye per acre. If this can be got off early enough, sow turnips; if not, winter vetches to cut for hay. Then get it in good tilth and sow turnip-rooted cabbages, in rows three feet apart. This plant seldom fails, if it has sufficient room, and the intervals be well horse-hoed; and you will find it the best spring-feed for sheep when turnips are over.

The horse-hoeing will clean and prepare the land for saintfoin; for the sowing of which I reckon April the best season. The usual way is to sow it broad-cast, four bushels to an acre; but I prefer sowing it in drills two feet asunder; for then it may be horse-hoed, and half the seed will be sufficient.

The horse-hoeing will not only clean the crop, but earth up the plants, and render them more luxuriant and lasting.

If

If you sow it broad-cast, give it a top-dressing in December or January, of rotten dung, or ashes, or, which I think still better, of both, mixed up in compost.

From various trials, I find that taking only one crop in a year, and feeding the after-growth, is better than to mow it twice. Cut it as soon as it is in full bloom, if the weather will permit. The hay will be the sweeter, and the strength of the plants less impaired, than if it stands till the seed is formed.

4<sup>thly</sup>; Light rich land, being the most easy to cultivate to advantage, and capable of bearing most kinds of grain, pulse, and herbage; I shall say little upon it. One thing however is very proper to be observed, that such lands are the best adapted to the drill-husbandry, especially where machines are used, which require shallow furrows to be made for the reception of the seed. This, if not prone to couch-grass, is the best of all soils for lucerne; which, if sown in two feet drills, and kept clean, will yield an astonishing quantity of the most excellent herbage. But I am convinced lucerne will never be cultivated to advantage, where couch-grass and weeds are very plentiful;  
nor

nor in the broad-cast method, even where they are not so; because horse-hoeing is essential to the vigorous growth of this plant.

*5thly*; Coarse rough land:—Plough deep in autumn; when it has lain two weeks, cross-plough it, and let it lie rough through the winter. In March give it another good ploughing; drag, rake, and harrow it well, to get out the rubbish, and sow four bushels of black oats per acre if the soil be wet, and white oats if dry. When about four inches high, roll them well after a shower: This will break the clods; and the fine mould falling among the roots of the plants will promote their growth greatly.

Some sow clover and ray grass among the oats, but I think it is bad husbandry. If you design it for clover, sow it single, and let a coat of dung be laid on in December. The snow and rain will then dilute its salts and oil, and carry them down among the roots of the plants. This is far better than mixing the crops on such land, for the oats will exhaust the soil so much, that the clover will be impoverished. The following summer you will have a good crop of clover, which cut once, and feed the after-growth. In the winter plough it  
in,

in, and let it lie till February: Then plough and harrow it well; and in March, if the soil be moist, plant beans in drills of three feet, to admit the horse-hoe freely. When you horse-hoe them a second time, sow a row of turnips in each interval, and they will succeed very well. But if the land be strong enough for sowing wheat as soon as the beans are off, the turnips may be omitted.

I am, your's, &c.

B—— S——d, Herts,  
May 14, 1782.

B. K.

#### ARTICLE XXX.

*The Value of Carrots ascertained;—and Observations on the Premiums offered by the Society, in 1782.*

GENTLEMEN,

HAVING given a recital of my trial of carrots in a preceding letter, I shall at present confine myself to the point of ascertaining their value, which I have already observed to be so undecided a question.

Among

Among other uses, my crop of 1780 was applied partly to finishing the fattening of some wether lambs, that had had the summer's grafs. I had twenty-six of them which ought to have been fat at Michaelmas, but my food coming short, they were not in the autumn saleable to a butcher. I had some confidence in carrots, but I wanted them for my horses, and I tried various butchers as well as dealers to get rid of my sheep, but could not. I had given 6s. 6d. each for them in September 1779, and yet was offered no more for them than 10s. I determined therefore to put them to carrots.

Nov. 4, 1780, I inclosed a pen with herdles on a dry meadow, put the sheep in, and supplied them with carrots, moving the herdles on as they soiled the ground so as to make it too dirty to eat upon; but as the improvement of the land was one object, being mossy and hide-bound, I did not shift them 'till the grafs was quite black with their dung, and much better folded than is ever done in the common way.

'Till the 21st, they ate no more than two bushels (weight 56lb. each) a day. I then find from my minutes that they ate three 'till the 25th,  
and

and by the 28th they had got to fix ; but some days they ate eight, and even ten ; in others only five were given, to make them eat clean. By the 16th of December, the quantity was pretty regularly five a day. But I found upon an average of the whole experiment, that the quantity might in a general way be reckoned at four bushels a day feeding twenty lambs. They weighed alive at putting to carrots 100lb. each.

April 3d, they were all fold and killed fat.

10 of them fold at 15s.	————	£. 7 10 0
15 ————— 14s.	————	10 10 0
9 ————— 12s.	————	5 8 0
2 ————— 18s.	————	1 16 0
		<hr/>
		£. 25 4 0
Value at putting up	————	18 0 0
		<hr/>
Product of the carrots	————	£. 7 4 0
		<hr/>

They ate four hundred and seven bushels, at which 7l. 4s. may be called 4d. per bushel.

Your Secretary mentions my having sent the experiment of the culture before, the profit neat per acre was about 2l.

This



This is a single experiment, from which I shall draw few conclusions; I am of opinion that carrots will be found oftner much to exceed this than fall short of it.

The land was sown with barley, produced a good crop, and by much the cleanest of any in the parish. I shewed it to several gentlemen as an absolutely *clean* crop; because I had heard it asserted that the culture of carrots made land foul.

The grafs upon which the sheep were fed (and which amounted to about an acre) was very little improved for the crop of hay 1781, owing to the dry season; but in that of 1782 was greatly superior to the adjoining parts of the same field, and more improved in quality than quantity; for instead of an indifferent vegetation scattered thick with the *centaurea scabiosa*, *filage*, *rhinanthus crista galli*, and *linum catharticum*, with other plants of little worth, it encouraged a very beautiful sheet of the best plants that can appear in a meadow, viz. the *lathyrus pratensis*, *achillea mille folium*, *trifolium repens*, *trifolium ochroleucrum*, *trifolium alpestre*, and the *plantago lanceolata*.

As

As I have thus given you the result of this carrot experiment, I must be allowed just to observe, that this price of 4d. is great enough to induce any man to cultivate them. We reckon in this country that turnips rarely do more than pay their own expences, and in many years not that. But if a man has the right carrot soil, he may, without manure, and without any extraordinary fertility, expect from four to five hundred bushels an acre. If he gets four hundred and twenty it is just 7l.; and as the expences amount to about 5l. it leaves a neat profit upon a fallow crop of 2l. an acre, which is greater than attends the best wheat crops of this kingdom.—I could extend these reflections, but as it is only a single experiment, I do no more than call upon others to try similar ones, that from a great variety of applications the real value may be known.

The winter following I tried a similar experiment on potatoes; and as the result was remarkable, I shall add it.

Nov. 21, 1781, weighed alive sixteen wether lambs, that, like the former, had had the summer's grafs. Average weight 89lb. in all 1,432lb. Herdled a pen on dry grafs, and gave them potatoes,

atoes, the cluster sort. In the first twenty-three days they ate but twenty-five bushels. Perceiving them to look very thin, I weighed them again, January 14, and the total weight then was 1,264lb. they had consequently lost 168lb. ; by the 16th, they had eaten sixty bushels, and I then put them to turnips. Thus nothing could be more decisive against *this* application of clustered potatoes.

I was, however, informed in Ireland of a score or two of wethers being raised to an uncommon degree of fatness by potatoes ; but they were probably the common sort, which I am apt to think from some other cases, as well as from their superior farinaciousness, are of a more feeding quality.

Thus having ventured these two small experiments to your examination, permit me a few observations on the premiums ordered by you in January 1782, an object of more general importance, and which, by being considered in various lights, and made a subject of discourse in your associated counties, must necessarily tend to throw your patriotic designs gradually into the very best channel for the publick good.

There

There are two great objects to which the exertions of such a society as your's may be directed :  
 1. To introduce into such parts of your county as are ill-cultivated, the husbandry of other better-managed districts ; 2. To refine upon such husbandry, and attempt to carry it to an ideal perfection. Subordinate and inferior are ; 1. To procure general experimental information ; 2. To encourage the industry and skill of your labouring poor.—I perceive by your premiums that you have aimed at all these, and various other objects.

In whatever manner individuals of fortune may amuse themselves, and with whatever success, still I am of opinion that, relative to the general agriculture of a district, no refinement, no complex, difficult, or doubtful practices should be introduced or recommended. These are the parts of the art that very often fail, and no endeavour fails without doing great mischief to a whole neighbourhood. Suppose a gentleman in some remote part of Wales, where clover is quite unknown, instead of simply recommending the plant to be sown on clean land, drills and horse-hoes it ; he fails ; probably the plant itself in that district will lie under such a ridicule that it would be rejected,

even when others, where no such failure had happened, had received it.

Your premiums for the culture of turnips are in the right channel, the great outline; but why a horse-hoe for turnips? Can you wish for a greater improvement than to cover your dry lands with the noble crops of Norfolk? But (the fields of possibly two or three whimsical gentlemen excepted) there is not a horse-hoed crop of turnips in that county; yet I have walked over fields near a mile long, where the regularity of the plant, the compleatness of the hoeing, and the freedom from weeds, formed a truly beautiful spectacle. Norfolk husbandry, on the dry lands of your counties, would make a noble figure, tho' a horse-hoe had never existed.

Setting wheat is another practice of more refinement, that has taken place in the eastern part of Norfolk, which is the manufacturing and very populous part of the county, but is not that district by any means which has given a sanction to what is commonly called *Norfolk Husbandry*, which exclusively belongs to the North-Eastern angle of the county, where little or no setting of wheat is to be met with. It is however a refinement on  
the

the clover tillage for wheat, and in my opinion ought no where to be attempted till the clover itself is generally and very well established; since should the farmers once get an idea that setting wheat is *a part of that Husbandry*, it might retard the full establishment of clover, which would undoubtedly be doing more mischief to your counties than all the exertions of an hundred societies can ever do good.

Premiums 8 and 9, 14, 15, 28, 29, 43, buckwheat, vetches, carrots, rape, flax, apples, and cabbages, are unexceptionable; they come clearly within the first definition, introducing into your counties practices that succeed very well in common management elsewhere. But why give three guineas for the winter vetch, and six for the summer one? The winter one is an object of the first consequence, the summer one of very little. Premium 15 does not say whether the rape is for feeding cattle or for seed; the former excellent husbandry; the latter has alone ruined many farms.—But the object of saintfoin (11) is of yet greater importance; you deserve the greatest praise for attending to that noble grass.—But as to Hops, (44) the same observation is by no means applicable. It is a culture only fit for



natural dunghills, or the vicinity of great cities. The greatest improvement that could be introduced into Suffex would be to grub up all the hops ; five or six acres, on a farm of 100 or 150, nearly ruin it, by receiving all the dung. If you succeed, and make this a common husbandry in your counties, think no more of turnips, cabbages, or any other plant that demands the dunghill.

Zealand barley, composts, potatoe feed, parsley, yellow vetch, the curl, and grasses ; they are all either refinements, or dubious, and consequently come under that head which demands much consideration. If you succeed and they are introduced, it is unknown whether your success be a benefit or not ; whereas in other objects of greater account, no such doubt can be entertained. I do not mean to find any fault with a wish to see *gentlemen* try experiments on parsley, which I believe is a valuable object, or with the yellow vetch, which I know experimentally to be one of the finest plants we have in England ; but they are no points for Somerset *farmers* to think of. As to *grasses* properly called, you should recollect one fact, that the very finest upland meadows, or low ones on a good soil, that are found in England, are those that have least *grass*. It is the class *Diadelphia* that clothes the richest in the kingdom.

As



As to any premium relative to the *general and indiscriminate* use of drill-ploughs and horse-hoes, particularly for white corn, turnips, or saintfoine, I think all attempts to introduce them perfectly visionary; in some measure harmless, because the introduction will never be effected; but hurtful to every society that offers it, because it will shew (to common farmers) that they are unacquainted with the objects they patronize; and he who recommends the broad-cast culture of clover will do it with no great authority, if he couples with his advice the impracticable scheme of the Tullian culture of oats and barley.

With respect to the premium for fattening Turkeys; how that can be a national object is perfectly incomprehensible to me. When it is considered, that whatever food will fatten a turkey will also fatten a hog; that pork is food for the lower classes; and that poultry, in such a kingdom as this, must always be beyond their expenditure; it may not perhaps be thought of no consequence, but rather (tending to make pork dearer) it may appear to be more prejudicial than useful.

Thus, gentlemen, I have troubled you with a few observations on your last year's premiums. It

is a subject that nearly concerns all the societies of the kingdom; for as the benefit they do must be chiefly by these means, it is an object of no trifling import, that they be devised with great caution, foresight, and knowledge of the subject. A considerable degree of esteem and reputation belong to men who give their time, attention, and money, for the publick good. Errors in them have a large range, and a proportionable effect. The mistakes of an individual may concern only himself: If you commit one, three provinces will feel the weight. For this reason I think there is no subject more proper on which publickly to communicate with you. Some future correspondent may correct me if I am wrong;—but publick enquiries into the best means by which a Society can advance the agriculture of a country, are more likely to prove of consequence than the recital of any experiments in the power of an individual possessing no more advantages than I do.

I am, Gentlemen, with all imaginable respect,

Your obliged and devoted servant,

ARTHUR YOUNG.

Bradfield-Hall, Dec. 21, 1782.

[The Society are much obliged to Mr. Young for his several very obliging and valuable communications. In the list of their premiums for 1783, he will observe attention has been paid to his ingenious hints and observations.]

## ARTICLE XXXI.

*On the Nature of Soils.*

[From a Norfolk Gentleman to the Secretary.]

S I R,

**A**S a knowledge of the different soils is of great importance to the farmer, an enquiry into, and description of their nature and properties, so far as relates to the great purposes of vegetation, seems to claim our first attention, and to be the ground-work of agriculture.

Without descending to those nice distinctions which are rather subjects of curiosity to the philosopher, than of use to the farmer, we may rank all our varieties of soil under the following heads:

Sand,	Gravel,	Loam,
Clay,	Chalk,	Marle.

By different combinations of these substances all the intermediate kinds of soil are formed; and upon a proper mixture of them, in certain proportions, depend the general fertility of the earth, and the success of the farmer's labour.

In the nature of soils, the two extremes are, tough wet clay, and loose dry sand. Each of

these has its peculiar plants which will not grow in the other, although they are few in number, and of little known use. But the plants common to both these soils will grow and thrive better in loam, which is a middle species of earth composed of these two extremes, partaking equally of the good qualities of both, without the bad ones. For this reason, lands which partake of the different properties of clay and sand, or which, in other words, are a kind of compound wherein the properties of clay and sand are so united as to correct each other, are generally the most fruitful, and produce the greatest mass of vegetables. This will more evidently appear, if it be considered in what manner plants and vegetables are nourished, and what it is that gives them bulk, vigour, and firmness.

When the seeds of plants are deposited in the earth, certain degrees of warmth, air, and moisture, are necessary for the expansion of their vessels, and the extension and firmness of their fibres and solid parts. For these purposes stiff clay, and loose sand, are both, while separate, very unfavourable; the former by the closeness of its texture retains the water like a dish, admits too little heat or air, and prevents the tender  
fibres

fibres of young plants from shooting freely to such distances as are necessary for obtaining a sufficient quantity of proper nourishment. The latter, (sand) from the looseness of its texture, admits heat too freely, and is not capable of retaining a sufficient degree of moisture for the purposes of vegetation. The particles of vegetable nutriment are either absorbed by the heat, or washed down by the rains too low for the roots of plants to reach them. Hence few plants will come to maturity on mere sand, except such as extend their roots very deep, and attract nourishment from a stratum below it.

It is necessary also to observe, that in stiff clays there is little fermentation, the salts being so confined and locked up by the tenacity of its texture, that they cannot act. On the contrary, in light dry sands they are speedily evaporated by heat.

All sands are hot and dry—all clays cold and wet; and therefore the manuring sandy lands with clay, or clay lands with sand, is the best of all, for this changes the nature of the land itself, whereas dung, and other substances, afford only an inferior and temporary improvement. Mixed soils which incline to the clayey kind are best of all  
for

for corn and pulse. But it is not the natural soil only that the farmers ought to consider, but the depth of it, and what lies immediately underneath it. For if the richest soil is only seven or eight inches deep, and lies on a cold wet clay or stone, it will not be so fruitful as leaner soils that lie on a better under-stratum.

Gravel is perhaps the best under-stratum to make the land prolific.

The best loams, and natural earths, are of a bright brown, or hazely colour. Hence they are in this county called hazel loams. They cut smooth, and tolerably easy, without clinging to the spade or plough-share;—are light, friable, and fall into small clods, without chapping or cracking in dry weather, or turning into mortar when wet. Next to these, the dark grey, and russet mould, are accounted the best. The worst of all are the light and dark ash-coloured.

The goodness of land may also be very well judged of by the smell and the touch. The best emits a fresh pleasant scent, on being dug or ploughed up, especially after rain; and being a just proportion of sand and clay intimately blended,  
will



will not stick much to the fingers on handling. But all soils, however good, may be impoverished, and even worn out, by successive crops without rest, especially if the ploughings are not very frequently repeated before the seed is sown.

The famous Mr. Tull, indeed, carried his idea of the advantage of repeated ploughings to such a height, as to suppose they would supply the place of manure entirely. This was doubtless an error; but an error which men are very liable to fall into from their warmth in supporting a favourite hypothesis. Repeated ploughings, however, are an excellent method of rendering land sweet and fertile, by destroying the weeds, and exposing all its parts to the kindly influences of the sun and air, by which means it attracts a larger quantity of salts, and is better pulverized.

If we examine tracts of land which have not been cultivated, we find nature has adopted different kinds of plants to most of the distinguishable varieties of soils; and although some belonging to *one*, may from some cause or other be found on lands of a different quality, they seldom thrive, or perfect their seeds, so as to become general.

Mr.



Mr. Tull thinks that the only difference in soils, except their richness, is occasioned by the different degrees of heat and moisture that they receive; and that *earth*, of whatever kind it be, is equally proper for the production of plants in general, provided the heat and moisture be equally adjusted. But in this I am inclined to think Mr. Tull is mistaken.

His instance that rushes, when taken from a low watry ground, and planted on a dry hill, will grow and flourish there, provided a plenty of water be given them, does not prove his position: For in this case, by the addition of water, the state of the soil is changed, and becomes similar to that from whence the rushes were taken, and which is natural to them.

There is (as I before observed) a specific difference of soils, and of the plants naturally growing in each.

The great care of the farmer ought therefore to be, by proper mixtures, to reduce his land to that state and temperament in which the extremes of hot and cold, wet and dry, are best corrected by each other; to give them every possible advantage

vantage flowing from the benign influences of sun and air; to adopt such kinds of plants as they afford in this state the greatest nourishment to; and to renew their fertility by a judicious allowance of the most proper manures. Where these things are done, there are few spots so unfriendly to cultivation as not to repay his expence and labour with a plentiful increase: But without these, the best tracts of land will in time become a barren waste, or produce little but weeds.

I am, &c.

W——n, Feb. 28, 1783.

T. S.

N. B. In my next I will consider chalky soils.

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#### ARTICLE XXXII.

*Some of the superior Advantages of the Drill  
to the Broadcast Husbandry pointed out.*

[By a Gentleman Farmer in Kent.]

GENTLEMEN,

SEEING by your advertisements in the St. James's Chronicle, that the publishing a second volume of select papers was one of your resolutions,

tions, I am induced to offer a few remarks on the Drill-Husbandry; the substance at least of which I should be happy to see inserted therein, if you think them worthy your attention.

Notwithstanding the decided superiority of the Drill-Husbandry in many kinds of grain, pulse, and grasses, many farmers are still enemies to it; and a still greater number are too indolent to go one step out of the old beaten path, though the advantages they might reap are obvious.

This was the case many years in this county with respect to hoeing of turnips; but those prejudices are now generally overcome; and we have very few, if any, farmers stupid or obstinate enough to sow turnips without having them twice well hoed.

Some reasons indeed may be urged in favour of a few persons not adopting the Drill-Husbandry, because the warmest advocates for it must allow, that there are soils, and situations, wherein the broadcast method is preferable, at least in many cases. But these instances are but few, and ought not by any means to check it in the general.

Drill-

Drill-Husbandry is, as a good writer has justly defined it, "*the practice of a garden brought into the field.*" Every man of the least reflection must be sensible, that the practice of the garden is much *better* than that of the field, only a little more expensive; but if (as is the case) this extra expence be generally much more than repaid by the superior goodness and value of drilled crops, it ought to have no weight in comparing the two modes of husbandry.

In the broadcast method the land is often sown in bad tilth, and always scattered at random, sometimes by very unskilful hands. In drilling, the land must be in fine order; the seed is set in trenches drawn regularly, all of nearly an equal depth, and that depth suited to the nature of each kind of seed. These seeds are also distributed at proper distances, and by being equally and speedily covered, are protected from vermin and other injuries; so that the practice of the garden is here exactly introduced into the field.

In the broadcast method, the seed falls in some places too thick, in others too thin; and being imperfectly covered, a part of it is devoured by vermin which follow the sower; another part is  
left

left exposed to rain or frost, or to heats, which greatly injure it. When harrowed in, a great part of it (small seeds especially) is buried so deep, that if the soil be wet, it perishes before it can vegetate.

Again; When thus sown, there is no meddling with the crop afterwards, because its growth is irregular. The soil cannot be broken to give it more nourishment, nor can even the weeds be destroyed without much inconvenience and injury.

But in the Drill-Husbandry the intervals between the rows, whether double or single, may be horse-hoed; and thereby nourishment may repeatedly be given to the plants, and the weeds almost totally destroyed.

The very same effects which digging has upon young shrubs and trees in a garden, will result from horse-hoeing in a field, whether the crop be corn or pulse: For the reason of the thing is the same in both cases, and being founded in nature and fact, cannot ever fail. In drilling, no more plants are raised on the soil than it can well support; and by dividing and breaking the ground they have the full advantage of all its fertility.

The

The plough prepares the land for a crop, but goes no further; for in the broadcast husbandry it cannot be used; but the crop receives greater benefit from the tillage of the land by the horse-hoe, while it is growing, than it could in the preparation. No care in tilling the land previous to sowing can prevent weeds rising with the crop; and if these weeds be not destroyed while the crop is growing, they will greatly injure it. In the broadcast husbandry this cannot be done; but in drilling, the horse-hoe will effect it easily.

And what adds to the farmer's misfortune is, that the most pernicious weeds have seeds winged with down, which are carried by the wind to great distances; such are thistles, fowthistles, coltsfoot, and some others.

If the expence of horse-hoeing be objected, there are two answers which may very properly be made: The first is, that this expence is much less than that of hand-hoeing were it practicable, or of hand-weeding. The second is, that it is more than repaid by the quantity of seed saved by drilling; to say nothing of the extra quantity and goodness of the crops, which are generally self-evident.

From these considerations, founded on, and justly drawn from established facts, the comparative advantage is so great in favour of the drill-husbandry, that it must be strikingly visible to every unprejudiced person.

I am, Gentlemen, your's, &c.

H. L.

R — r, Feb. 16, 1783.

#### ARTICLE XXXIII.

*On drilling Turnips with Wheat, drilled between the Rows.*

[By an Hertfordshire Correspondent.]

GENTLEMEN,

**I** RECEIVED the premium-book sent by your Secretary, for which you have my thanks. I will endeavour if possible to procure satisfactory answers to your printed queries; but in the mean time beg leave to inform you of an experiment made by an ingenious farmer in my neighbourhood, which to me is *new*, but I think a very good one.

Having



Having drilled a small field of spring wheat in rows two feet a-part, a thought struck him of sowing turnips in the intervals. Accordingly, in May he did so by hand. The turnips came up very well, and were thinned with the hoe once. The wheat was a very good crop, and yielded better than another field of about the same soil did, sown broadcast in autumn, although it ripened somewhat later. On cutting it, the turnips were no otherwise injured, than by having some of the large leaves trodden down by the reapers. After harvest, the weeds were cut up round the turnips with a hand-hoe, and they grew very large and vigorous. They were of the purple and white long kind, and the crop proved nearly as good as the same land produced in common.

The farmer fed them off the field in December, and ploughing in the stubble, left it in that state till March, when he prepared it by two more ploughings for barley and clover, of which he had a crop that yielded near forty bushels per acre, and the plant of clover was so good that the cattle preferred the straw to common hay.

I am, your very humble servant,

B——d, Oct. 6, 1781.

T. N.

## ARTICLE XXXIV.

*On Quick - Hedges.*

[By a Gentleman near Bridgwater.]

GENTLEMEN,

February 21, 1783.

**B**EING lately through Gloucestershire, or at least that part of it between Bath and Cirencester, I was much surprized to see such a number of dead wall fences still remaining, to the disgrace of the country and its owners.

If they regarded beauty, or use, or the saving expence in the least degree, I think they would follow the example of their wiser neighbours in raising quick-hedges, which are not only far more ornamental, but also far more useful and profitable. The benefits which cattle receive from their shelter in winter, and their shade in summer, and which themselves would reap by the thorns and fire-wood they yield, are matters too important for any good farmer to neglect, without incurring deserved censure.

In all inclosed lands, the farmer must keep up good fences if he would reap the fruits of his labour;

labour; for by these it is that his crops are protected from external injuries.

There are many shrubs of which hedges may be made, but among them all there are none equal to the white and black thorns, that will suit the generality of soils, and are easily propagated. But a good husbandman will never think his hedge finished till he has placed trees in different parts of it, and of such kinds as are best adapted to his respective soil. In order to know what kinds of trees these are, he need only observe which sorts flourish best on the same kinds of soil in other places.

As I have had some experience in rearing quick-hedges, permit me to mention the methods I took in raising and preserving them.

I have for more than thirty years cultivated about one hundred acres of land, principally on account of its being to me a pleasing employment. When I first succeeded to this estate, there had indeed been some quick-hedges formerly planted; but they had been so badly managed as to be of little use, and incapable of much improvement. I therefore rather chose to plant them a-new than

to run the risk of unsuccessful labour and expence in trying to recover and bring the old ones into good order.

Some of my plants I raised in a nursery from the haws, and others I drew up in the woods, and wherever they could be found. I made my banks flat, and three feet wide at the top, with a sloping side next the ditches, which were dug two feet below the surface of the field, and one foot wide at the bottom. The turfs were regularly laid with the grass downwards, on that side of the ditch on which the hedge was to be raised, and the best of the mould laid at top. My fetts were strait, smooth, and even-growing ones, and planted as soon as possible after taking up. I planted them at a foot distance; and about every forty feet I set young fruit or other trees, such as ash, oak, beech, elm, according as the soil suited them. I then laid in a second row of quick-fetts, on another bed of fresh earth, at the same distance, and covered them over with good mould. The planting thus ended, I finished the bank, and secured it properly from injuries by a dead hedge well wrought together, and fastened by stakes of oak trees on the top of the bank at three feet distance.

The

The time I planted it was the latter end of February, which time I prefer to October, and in general the plants succeed best at that time. In autumn I cleared it from weeds.

The following spring I examined my hedges carefully, securing the stakes where they were loosened, and filling up any holes that were made. Wherever any of the quick-sets had failed, or appeared dwindling, I replaced them with fresh ones from my nursery; and also such of the young trees as had been planted on the top of the bank; and cleared the whole from weeds.

In one field it happened that my sheep had eaten off many of the young shoots; but as I thought they would recover, I did not replace them; but I afterwards found it would have been best to have done so, for they never grew so as to overtake the rest, and my hedge was unequal and much inferior to the other. The principal care now necessary was, to keep the quick free from weeds, and well protected from cattle, till it was of an age fit for plashing, which, if it is healthy and vigorous, may be done in its seventh or eighth year. It will however be right to go over it once a year during that time with a knife,

and cut off the redundant, or ill-shaped and straggling branches, keeping the face of it as smooth and even as possible; and also root up all entangling weeds, which, by confining it, would otherwise spoil its beauty and hinder its growth.

The weeds most destructive to young hedges are, white and black bryony, bindweed, and the traveller's joy. White bryony has leaves like the vine, and its berries are red; the root is as big as a man's leg, and runs very deep. Black bryony will grow thirty feet long, and with its clasping tendrils will entangle and choke the young quick all the way. As its root is very large, it must be dug out deep to destroy it.

Traveller's joy has woody stalks, with a rough bark; the leaves are small, and of a pale colour, and it bears white cottony tufts in autumn; it is more destructive to young quick-hedges than any other, overshadowing it like an arbour. The root of this plant is not deep like the rest, but care must be taken to get it up entire, for the least piece left will send up fresh shoots next spring.

The first plashing may be performed at eight years old, but this should be repeated at fourteen  
or

or twenty years growth ; the first will be the least troublesome,—the last most necessary. The method of plashing being pretty well known in places where quick-hedges are common, I shall not enlarge upon it, especially as there are some very proper directions given in the Farmer's Magazine, a work abounding with useful and interesting matter to the husbandman.

But I would observe, that at the first plashing, all the rubbish, weeds, and filth, should be cleaned away from the roots of the young quick, the superfluous straggling roots cut off, and a quantity of the best mould from the bottom of the ditch should be laid on them to fill up the holes, and strengthen the plants ; at the same time the fruit, or young timber-trees, should be pruned up.

When the hedge is new plashed, it shoots out very vigorously, and these fresh young shoots are very tempting to cattle. They should therefore be well secured ; and if you can avoid it, never feed cattle in the field that same year. But if some cattle must be pastured there, horses will do far less injury than cows, oxen, or sheep ; the latter are worst of all. The best season for plashing, as well as for planting quick-hedges, is February.

I shall



I shall now add a few observations relative to the advantage arising from quick-hedges. This greatly depends on the care taken by the farmer at the time of plashing, to see the work done himself. If he leaves it to careless and negligent workmen, the labour and cost of years may be lost in a day.

If hedges were of no other use than as fences, it would be the farmer's interest to keep them up carefully; for the better they are, the more secure are his cattle and crops. But if a judicious mixture of cider fruit-trees were planted in hedges, the profit arising from *them only* would abundantly repay all the cost of the whole without any loss of ground.

It may possibly be objected by some, that the hedges would often be hurt by the boys climbing up to get the fruit; but those who make it should remember, or be told, that the best kinds of cider-fruit are so hard and austere at the time of their being gathered, that nobody can eat them, and even hogs will hardly touch them. But the greatest benefit, where no fruit-trees are planted, arises from the thorns and wood which quick-hedges yield for the fire, and many other purposes.

I have

I have in a single year, from my hedges, and the trees I planted in them, cut as much wood as I have sold for eight or ten guineas, besides the expences, and the quantity I used for other purposes.

I am, Gentlemen, your humble servant,

A. B.

ARTICLE XXXV.

*On Planting Waste Grounds.*

[From a Norfolk Gentleman, a Visitor at Bath.]

GENTLEMEN,

AS I have made planting a favourite amusement, I take the freedom of submitting a few thoughts thereon to your consideration.

My residence is in Norfolk, a county in which sixty years since there were vast tracts of uncultivated, and as was then thought, barren land. The western parts of it abounded with sand of so light a texture, that they were carried about by every wind; and in many places the sands were so loose that no grass could grow upon them.

Art

Art and industry, however, have now so altered the face of this once Arabian desert, that it wears a very different appearance. Most of these tracts are either planted or rendered very good corn-land, and sheep-walks.

I see by your last volume you have already been informed by Mr. Beevor, and other Gentlemen, of the progress and effects of marling, and of their turnip husbandry; and therefore shall confine my present remarks principally to planting, especially as my residence is in that part of the county where the most barren soil has been thus enriched.

About thirty years since, the sides of many of our little sand-hills were sown with the seeds of French furze, and when a wet season followed, they succeeded very well, and grew so fast, that once in three or four years they are cut for fuel, and sell at a good price at Thetford, Brandon, Harling, Swaffham, and places adjacent. This excited some public-spirited Gentlemen, among whom was the late Mr. Buxton, of Shadwell-Lodge, near Thetford, to attempt the planting of Scotch and spruce firs, and other hardy forest-trees. At first they found some difficulty from the extreme looseness of the sand. But as there  
is

is in all this part of the country fine white and yellow marle, at about three feet depth below the sand, they very judiciously thought that incorporating it with the sand in the holes where their young trees were planted, would insure success; nor were they disappointed.

The method succeeded beyond expectation; the plantations thrive exceedingly, and the roots soon reached below the sand, after which they were out of danger. This excited them to further attempts.

On the spots where they intended to raise new plantations from seeds and acorns, they laid on a thick coat of marle and clay, which after being rough spread, and lying a winter in that state, was made fine, and ploughed in just before planting. By these means the soil became fixed, and in a little time covered with grafs and herbage; so that there are now vast plantations of firs, oak, and forest-trees, in the most healthy and vigorous state, where within my memory ten acres of land would not maintain a single sheep three months.

But the benefit of plantations, whether of shrubs, copse, or trees, is not confined to the immediate advantage,

advantage, or even the future value of the wood. By annually shedding a great number of leaves, which the winds disperse, and the rains wash into the soil, it is considerably improved; and whenever such copses have been stubbed up, the ground (however unfruitful before planting) has thereby been so enriched as to bear excellent crops for many years, without the additional help of manure.

How much land-owners are interested in planting waste or barren spots I need not mention; and nothing but a degree of indolence or ignorance unpardonable in this enlightened age could induce them to neglect it.

Nature has furnished us with plants, trees, and shrubs, adapted to almost every soil and situation; and as the laws of vegetation are now much better understood than formerly, it is a reproach to those whose practice does not keep pace with their knowledge in making the best use of her bounty.

Let no man repine and say *the land is barren*; for those spots which appear to be so, owe that appearance to human negligence. Industry and art might soon render an eighth part of this kingdom

dom

dom nearly as valuable as the rest, which now remains in a state unprofitable to the owners, and disgraceful to the community.

I have the honour to be, Gentlemen,

Your very humble servant,

March 7, 1783.

W. H—N.

ARTICLE XXXVI.

*Observations on Cow Clover, and Cow Wheat.*

[By Mr. William Curtis, Author of the *Flora Londoniensis*.]

GENTLEMEN,

THE subject of the queries which I had the honour of receiving from you, has often engaged my attention; and I have frequently wondered that many sensible farmers and seedsmen with whom I am acquainted, or have conversed, should know so little of a plant for which the latter have so great a demand. If the following observations should prove in the least satisfactory, I shall be highly gratified.

*First;*

*First*; *Cow-Clover*, or *Cow-Grass*, are, I doubt not, the same plant; but *Cow-Wheat* belongs to a very different genus; the *Melampyrum* of Linnæus.

*2dly*; There are, growing wild in this country, two species of clover, much resembling each other in size, and in the colour of their blossoms. The one is the *Trefolium Pratense*; the other, the *Trefolium Alpestre* of Linnæus. The former is the common broad-leaved clover; the latter, the long-leaved, or creeping-rooted clover; for it differs from the common broad-leaved kind, not only in having longer and narrower leaves, but also in having a root not only perennial, but creeping.

Although I know with certainty that the seed of the broad-leaved clover is sold in the London shops for the true *Cow-grass*, yet I have often suspected that the different name of *Cow-grass* might originally have been given to the long-leaved sort; from its possessing some qualities superior to the other, and its seed not having been collected, the other has supplied its place.

However this may be, the ascertaining which of the two is the best food for cattle, is certainly  
an



an object worthy the Society's attention. If it should be found that the *Alpestre* is in any respect superior to the other, you may be the means of bringing it into general use. But should it prove inferior, the distinction of Cow-grafs will be abolished, and the farmer will be taught to depend on broad-leaved clover only.

I herewith send you a growing root of the *Alpestre*, or true long-leaved clover: A loamy soil will best suit it.

3dly; The seeds of the Cow-wheat are not to be had in any of the London shops. From the little experience I have had in cultivating this genus of plants, they do not seem to promise much; yet I would by no means wish to prevent, or even to discourage your making a fair trial of them.

I am, with great respect,

Your's, &c.

WILLIAM CURTIS.

Nov. 8, 1780.

## ARTICLE XXXVII.

*On Cow-Wheat, Cow-Grass, or Cow-Clover.*

GENTLEMEN,

**I**N answer to your Secretary's queries respecting Cow-Grass, Cow-Clover, and Cow-Wheat, be pleased to accept the following:—

I conceive that Cow-Grass, and Cow-Clover, have no specific distinction. All the grasses and trefoils [*Trifoliums*] are almost indiscriminately cropt in a certain state of vegetation by every neat beast. These distinctions must therefore be arbitrary or local, as the *Briza*, or Quaking-Grass, is in some counties called the Cow-Quake.

With respect to Cow-Wheat, it is unquestionably the *Melampyrum Arvense*, (purple Cow-Wheat) and has no affinity with either clover or grass; but is a good food for cattle, and as such it has been divers times recommended as a subject proper for cultivation.

It is a scarce plant, and perhaps not to be found in five counties in the kingdom; and being cropt  
close

close in almost every pasture where it grows, when such pastures are fed, it is rarely found but in difficult acclivities, or under the protection of brambles, furze, or thorns; and doth not arrive at maturity till late in the year.

It is a large plant, bearing a spike of purple flowers, with numerous floral leaves of the same colour. Its seeds when ripe, have a near resemblance to wheat, from which circumstance, no doubt, it obtained its name. Perhaps it is not to be bought at any seed-shop. I have not yet seen it in any botanic gardens. Inclosed are specimens of a few plants growing near Norwich, among which is one of the Cow-Wheat.

I am, very respectfully, your's, &c.

Norwich.

J. WAGSTAFFE.

#### ARTICLE XXXVIII.

##### *On the Profit of Carrots and Cabbages.*

S I R,

SINCE I received your last favour the weather has been so very inclement that I had it not in my power till yesterday to ascertain with any degree of precision the weight or value of my

Q 2

crops

crops of carrots and cabbages. In all my farming experiments, I would wish to avoid as much as possible all exaggerating ideas of the value of the produce; and for this reason I selected such parts of the field as were neither the *best* nor the *worst* of the crop. They were weighed with great exactness, and can be attested (if desired) on oath.

With respect to the former crop, (I mean of carrots) you will find the expence attending this method of cultivation greatly reduced, when compared with the crop for which I received the Society's premium in the year 1779; and yet the produce per acre was very little inferior. I never remember to have met in any Author with experiments to prove how far carrots may be profitably applied to the feeding of sheep in the months of March and April. To that purpose I intend devoting the whole five acres, and have no doubt but the profit attending this mode of consumption will equal any other.

How far my cabbage crop entitles me to the notice and approbation of the Society, I will not pretend to say; the cultivation and attention paid unto it deserved a better return. Yet I must observe, that considering the number of sugar-loaf

loaf intermixed with the Scotch, the produce is equal, if not superior, to any I ever read of; I mean on land of equal value. Besides, I must remark, that out of fifteen acres, certainly three acres of the right sort might be produced, which, if selected, would weigh at least ten tons per acre more than the annexed calculation.

However, I submit to the Society's determination, having no other view than the promotion of those good ends for which it was established.

I am, Sir, your humble servant,

Ashwick-Green,  
Nov. 12, 1781.

J. BILLINGSLEY.

### C A R R O T S.

Two perch dug in different parts of the field, neither the best or worst, produced

One	-	114 lb.	} average 109lb. <i>Tons. Cwt.</i>
The other	-	104 lb.	
			or per acre,        7    15

*Expences per acre.*

Rent	-	£. 1	0	0	which at only 20s. per ton, amounts to    £. 7   15   0
3 ploughings		0	12	0	
3 harrowings		0	3	0	
Sowing	- -	0	0	6	
Seed	- -	0	4	0	
Two hoeings		0	7	6	

				2	7	0
				<hr/>		
Profit				5	8	0

As I propose ploughing out, and folding the sheep on them, that expence will not exceed 5s. per acre.

C A B B A G E S.

£. s. d.

One row cut from end to end of the field, weighed 32 cwt. or per acre 36 tons, which at 4s. 6d. per ton, amounts to - 7 4 0

*Expences per acre.*

Rent	-	£. 0 10 0	
Manure	-	- 1 10 0	
Three ploughings	-	0 12 0	
Two harrowings	-	0 3 0	
Sowing, feed, and trans- planting	-	0 10 0	
Hand and horse-hoeing		0 8 0	3 13 0
			<hr/>
Profit			3 11 0

N. B. This land is in most excellent preparation for a crop of barley next spring; scarcely a weed to be seen in the whole field.

## ARTICLE XXXIX.

*On the Scab in Sheep, and some approved Remedies recommended.*

[By a Gentleman Farmer near Norwich.]

GENTLEMEN,

AS the disease called the scab in sheep is very often fatal, and occasions great loss to the farmer, I beg leave to trouble you with a few remarks thereon; and also to mention some of the best remedies yet discovered among our sheep breeders.

This disease is generally found most prevalent where the lands on which sheep are kept are wettest, or in the most rainy seasons.

In the isle of Ely some years since most of their flocks were diseased, and great numbers died. But I am of opinion, that this disorder is not always the effect either of moist air and food, or of lying on wet ground. It is doubtless often occasioned by the blood and juices of the animal being in an impure state; to which, however, an excess of moisture and rank food may very much contribute.

Many



Many persons have supposed the scab to be merely a cutaneous disease, and of course applied only external remedies to the part immediately affected, without considering that a purification of the blood was necessary to a radical cure. In such cases, these applications, administered singly, often do more harm than good, because they drive in the eruption, and fix the disease in the internal and more noble parts of the animal.

The best way therefore to treat this disorder is, on its first appearance, to give the sheep something inwardly to drive *out* the eruption; and then external applications are made with propriety, and generally with success.

The following recipe has been tried and found effectual in numerous instances in this county and in Suffolk, where very large flocks are kept:—

Take a gallon of soft well or pond water, and divide it into two equal parts. In one pint dissolve eight ounces of old hard soap, to which, when dissolved, add two ounces of spirits of hartshorn, and half a pound of common salt, with four ounces of roll brimstone, finely powdered and sifted. In the other part of the water put two  
 ounces

ounces of leaf tobacco, and one ounce of hellebore root. Boil this second part till you have a strong infusion, and then strain it off.

Next take that part of the water first mentioned, and set it over the fire; let it boil half an hour, stirring it all the while with a wooden ladle. In the mean time heat again the second part, in which the tobacco and hellebore were infused; and when hot mix the two parts gradually together over the fire, keeping the mixture stirring all the time, which should be about a quarter of an hour. When quite cold, put it in a stone bottle for use, and set it in a cool place.

Then take four quarts of new ale or beer, put into it twelve ounces of salt, two ounces of bay salt, and eight ounces of pounded nitre, together with twelve ounces of pounded roll brimstone. Set them over a gentle fire, and when the ale boils take off the scum. When it has boiled half an hour set it by to cool, and when cold put it in a stone bottle for use.

When you are thus far prepared, take one quart of ale, and set it on the fire, mix into it by degrees three ounces of sulphur; when just ready to boil,  
take

take it off the fire, and let it stand to cool; and when only blood warm, give this quantity inwardly to three sheep. Repeat the dose three times, allowing one day's interval between each dose. This will drive out the disorder; and *then* the *first* mixture is to be rubbed on the distempered parts; and two days afterwards the *second* mixture, and so on alternately for eight or ten days, till the cure is effected. Sometimes two rubbings will be sufficient.

The only objection to this mode of cure is, that it is compound, troublesome, and rather expensive. This certainly has weight, because, where a large number of sheep are affected, it could not easily be practised. On this account some persons have adopted the following method of treating the disease, and with success also:—

Take half an ounce of good corrosive sublimate, and dissolve it in two quarts of rain water, to which add a common gill glass of spirits of turpentine. When the sheep is struck, make a circle round the maggots with some of the water, dropping it out of a bottle. This will prevent their getting away and hiding themselves among the wool. Then drop a little among them, and rub it about with the finger, which will presently kill them.

But

But I am still of the opinion, that something given inwardly is necessary to purify the blood; and perhaps nothing can be more efficacious than the first mixture described above. I have tried both methods, and always found, that when internal as well as external applications were used, the cure was most radical and lasting.

I am, Gentlemen,

Your faithful friend and servant,

T. B——R.

H——l, March 12, 1781.

#### ARTICLE XL.

##### *On preserving Turnips from the Fly.*

[By a Gentleman Farmer at Drayton in Norfolk.]

GENTLEMEN,

THE variety of experiments made use of during many years past for preserving that excellent and useful plant the turnip from the ravages of the fly, having proved in many instances ineffectual, or at least inadequate to the purpose intended; permit me, thro' the channel of your  
interesting

interesting publication, to offer the following to the public, which from three successive years trial I have found to answer in every respect. My discovery was owing to the following accident :—

A neighbouring farmer not having a sufficient quantity of manure for all his turnip land, was under the necessity of sowing four acres unmanured. The effect was, that the turnips on the manured part of the land were mostly eaten off by the fly; while four acres unmanured escaped without injury.

Having a small farm which I occupy for my own amusement, and being very anxious to promote improvements in agriculture, I determined in the following season to make some experiments from the above hint. Accordingly in the summer 1776, I manured five acres well for turnips, and tilled three acres and half in the usual way without any manure. Those which I manured were almost universally destroyed by the fly, in so much, that I was obliged to sow most of the land over again. The three acres and half which had no manure were intirely free from any injury. It must indeed be confessed, that when I came to draw them they were not nearly so large plants as the other.

Not

Not content with this single trial, I determined to repeat my experiment still farther: Therefore, in the latter end of autumn 1776, after having taken the haulm and feed off, I manured six acres of wheat-stubble, which I intended for turnips the ensuing season. This done, I immediately plowed it, leaving it to incorporate freely with the earth till the following summer, which had the desired effect; for the turnips which grew upon it were as large as those on the land which had been manured.

The two succeeding years, 1778 and 1779, I repeated this experiment, which answered beyond my utmost expectation. Hence I infer, that the fly is either ingendered in the new muck, [dung] or inticed by it. But when this manure is laid on in the autumn preceeding, it loses all its noxious qualities, and from what I have observed, retains all its nutritive ones; though, philosophically speaking, they are liable to be in some degree exhaled by the heat of the sun.

Another material advantage accruing from autumn manuring for turnips is, that all the seeds contained in the manure, and which of course are carried on the land with it, vegetate almost immediately,

diately, and are mostly killed by the severity of the winter; and the few that remain can seldom avoid destruction from the plough-share.

This is a more effectual means of cleansing lands of weeds than has hitherto been used, and considerably lessens the labour of turnip-hoers.

#### ARTICLE XLI.

*On sowing Turnips and Grain, and on some of the Discouragements which prevent Improvements in Agriculture.*

[By a Gentleman Farmer in Essex.]

GENTLEMEN,

I HAVE lately been favoured with a sight of your first volume of select papers, and find many very useful things contained therein: But I wish your correspondents would principally attend to facts established only by experience; for philosophical opinions, unsupported by facts, appear to me to bewilder rather than establish and inform.\*

\* We are in general of the same opinion with our correspondent; but in some cases, a philosophical explanation of the operations of nature, which (apparently) seem to contradict each other, appear to be both necessary and useful, and is entertaining to such of our readers as have studied agriculture as a science.



To give a full answer to your printed queries, would make a small volume; and as I have at present but a little time to spare, I shall only hint at such of them as are most generally important. Of these, Turnips claim our first attention, as being the basis of all good husbandry.

The most certain way that I have found of getting a good plant, is to make the land clean and fine as soon as the weather will permit, and to sow four pints of seed per acre. It may be justly objected, that if the fly does not take them, the plants will be so thick, that they cannot be easily hoed. This I will readily grant; but they may easily be thinned in that case, and made fit for the hoe, by harrowing them first. But when you sow only a pint per acre, and the fly takes them, there can be no expectation of a crop. When I have sown four pints of seed, I have not in one instance, as I remember, missed of a plant, altho' the fly has sometimes destroyed more than half of them, and much damaged the other.

One of your correspondents has given you a good account of his manuring his land well to make the turnips grow quick, thereby speedily to get into the rough leaf, in which state the fly will  
not

not touch them. But every farmer who sows a large quantity of turnips may not have it in his power so to do; though every one can sow a sufficient quantity of seed for the fly and himself too. Take this as a hint of my thoughts on the drill-husbandry.\*

I have known many great losses sustained for want of a good plant of corn; but very little loss by its being too thick: We can easily thin any corn, grain, or seed, when young, but we cannot so well add to it. Now, we are certain that all corn, grain, or seed, have many enemies that prey upon it, and the only way I know of to guard against them, is to keep the land sweet and clean by good tillage, and sow it full thick enough, rather than too thin; for although a thin plant may in a favourable season turn out a good crop, yet it is liable to many damages more than a thick one. Among these are the mildew, the grub or

\* We clearly perceive that our correspondent is not a friend to the drill-husbandry. This, we apprehend, proceeds from his not attending with his usual accuracy to the many incontestible advantages resulting from this improved mode of Agriculture. He has indeed fully granted the principles on which the drill-husbandry is founded, by recommending the land to be "*kept sweet and clean from weeds*;" but he seems not to have recollected, that this cannot by any expence or labour be so easily done in the broadcast, as in the drill-husbandry.

flue, and many insects will eat it rather than weeds; and it will also be choaked with weeds if not well hoed, which is an expence and trouble that indolent farmers will not readily submit to.

I cannot help remarking what one of your correspondents says in the first volume of your select papers,\* “ that the time has been when a farmer would carry a crust of bread in his pocket to market, and get a pint of three-halfpenny beer there and jog home contented.” What made me take notice of it was, that it breathes the same spirit manifested by a great land-steward in our neighbourhood, who cannot use one instrument in Agriculture, and has but little feeling for farmers: As though any thing were good enough for them; and as though farmers are, or at least ought to be made and used like beasts of burden, loaded hard and abused at their pleasure. Surely such gentlemen (if they may be called so) never read that old-fashioned book *the Bible*, in which we read, “ Thou shalt not muzzle the mouth of “ the ox that treadeth out the corn:” And that the husbandman must or ought to be the first par-

\* We do not recollect this passage in any of the letters published by the Society.

taker of the fruits. But I hope there is no person in your Society who is actuated by such a spirit; for it appears to me quite contrary to the very profession of encouraging Agriculture.

If a farmer takes a farm out of order, and the land be poor, the farmer to improve such a farm, and stock it well, ought in some cases to have as much money to cultivate it to the best advantage, as the land is worth; yet for such a person, however industrious, a crust in his pocket is (in the opinion of such stewards) good enough for him. And here I would ask, Is any tradesman in the like circumstances spoken so lightly of? Is not an industrious careful farmer as respectable a member of society as a tradesmen? Is he not at least equally necessary to the well-being and happiness of the state? What must we think of such men as say, (when a farmer rears a colt, and breaks it to make it fit for sale) "The farmers ride such horses, with high tails, that we cannot go the road for them?"

And if a farmer happens to squeeze a lemon once a year, it is an unpardonable offence. This steward says, "His horse shies so at the lemon skins, that he cannot get near the door." And when

when he lets a farm, he has let it so dear, that he thinks it necessary to say to the young farmer, " If " you go home and *work hard*, and *fare hard*, you " may get a living." I believe I may say with the greatest propriety, that the same young man, by so doing, could get a better living without the farm than with it. And therefore would ask you, Gentlemen, whether farmers ought to be so treated, or whether this is the right way to encourage Agriculture and to improve the value of estates?\*

As to instruments, I cannot tell what are used in your part of the kingdom; but I have heard that in Wales the ploughs are on so bad a construction, that they cannot hold them themselves to plough the land as it ought, without a driver. And I am informed by a person, a very good ploughman, who went into that country, that our ploughmen could not use them.

\* We perfectly agree with this gentleman, that the methods of letting farms, which he so justly censures in this and a former letter, are very great discouragements to Agriculture: And of such land stewards as he has here described, we can only say, that the fewer there are of them, the better it will be both for the proprietors and renters of farms. As there are no class of men more useful, there are none who deserve more to enjoy the fruits of their labour than farmers.

I hope the farmers in Somersetshire understand ploughing better than to employ a driver; for we are at no such needless expence in our country.

As to manures, those which will exceedingly enrich one sort of land will be of no service to another; and this happens frequently to be a fact where there is a great similitude to all appearance in the soil. Therefore, different experiments are necessary, and that on small pieces for trial.

I am, Gentlemen, your's, &c.

J. L.

April 28, 1783.

#### ARTICLE XLII.

*Observations on Rhubarb, and its Culture in England.*

[From the late Dr. John Fothergill.]

GENTLEMEN,

VERY soon after I received your Secretary's letter, I was seized with a disorder which rendered me incapable of attending to any thing but my own situation. I am now somewhat better, and hope, in the way to recover my usual health.

The

The Rhubarb which has been chiefly cultivated in this country, as the true officinal Rhubarb, is undoubtedly the *Rheum Palmatum*. From the appearance of the root when properly cured, and from its effects when used as a medicine, it seems to approach very near to, if it be not really, the Rhubarb of the shops. Many trials have been made of it, and the reports of it are in its favour. Yet I own I have my doubts, and think it would scarcely be advisable to recommend a general culture of it.

There is something in the native soil that imparts a virtue to plants which they sometimes do not possess in other places.

Of all the objects of culture in this country, I should least of all be disposed to promote the culture of drugs. What virtues they have, if they are good, we know pretty well; but as there is nothing more difficult in the course of practical science, than to ascertain the virtue or precise effect of any drug, so we may consider that which is raised in an unnatural or different soil, as a medicine of untried virtue. It *may* be the same with that which we import; it may, however, be different in some latent circumstance, and more



or less operative, and must therefore subject practitioners to the risque of disappointment, or the solicitude of attending numerous experiments, when they have already a medicine at hand of whose effects they are pretty certain.

We have three different markets, from some of which we may always hope to be tolerably well supplied with this drug; from Turkey, Russia, and the East-Indies. The kinds are in some respects different, but the differences are generally understood.

In all other important articles which can be raised better, and cheaper than those we import, by all means let us cultivate them, and with assiduity. Whatever other nations can raise and sell cheaper than we can do, and are willing to exchange for our manufactures, let us import from abroad. This is the basis of just policy and œconomy.

Be pleased to excuse this prolix answer to a simple pertinent question, and believe that I am, with great respect,

Your friend,

London, Jan. 12, 1779.

JOHN FOTHERGILL.

## ARTICLE XLIII.

*On the Care necessary in planting Potatoes.*

[By a Gentleman of Bristol.]

S I R,

WITH a design to promote the views of the Society, I take the liberty of communicating to you a thought which some time since occurred to me respecting the cultivation of Potatoes. It struck me, that to select the very prime part of a crop might be a probable means of preventing that general disease known under the name of *Curling*, and which is a sure prognostic of a poor, dwindling crop.

Many schemes have been proposed as likely to remedy this evil, but hitherto without success; nor have I observed that any one has recommended this method, which to me, at first sight, appears so feasible.

Intelligent farmers are particular, and even curious, in the choice of their seed-grain. But in respect to potatoes chosen for planting, they are mostly the rubbish of the crop.

Upon what principle this method is adopted it is hard to imagine, unless it be to save the inconsiderable trouble of cutting the setts.

The seed potatoes saved in like manner from the crop of this rubbish, it appears obvious, must be continually degenerating, till at length they will no more answer the trouble and expence of cultivation. Hence farmers are driven to the necessity of purchasing their seed potatoes at an expensive rate from distant parts of the kingdom; the supply also precarious, and good seasons for planting frequently lost.

It is true, the potatoes so purchased generally yield a favourable crop, with a suitable management, and a proper soil. But probably this arises from the very circumstance to which I allude; namely, their being the prime yield of such places from whence they are brought. This is indeed the fact, and a very natural one; for is it likely that an inferior kind would be selected for the purpose of sending a great distance for sale? especially of such an article as potatoes; the expences upon which, such as freight, loading, unloading, &c. are very high in proportion to their value.

Should

Should these hints merit the consideration of the Society, it would be superfluous in me to suggest any mode for bringing them to the test of experiment. I can only say for myself, that I intend to prove it; and being somewhat sanguine as to its success, I mean it to be on a pretty extensive scale. Perhaps I may try three or four acres with some very fine potatoes I have by me, the produce of this season, from Scottish setts.

Wishing the utmost success to your excellent institution, I am, Sir,

Your most obedient servant,

Dec. 2, 1782.

A SUBSCRIBER.

#### ARTICLE XLIV.

*A Method of sowing Turnip Seed to prevent the Fly from taking them.*

GENTLEMEN,

HAVING lately been informed of the following discovery, and thinking it highly deserving to be publickly known, I take the liberty of communicating it to your Society.

About

About Midsummer, take the first opportunity when it rains, or there is an apparent certainty of rain approaching, to sow your turnip seed; if about the full moon, the better. In this case neither harrow, brush, nor roll, after sowing. The natural heat of the ground at that season, and the consequent fermentation occasioned by copious rain, will give an astonishingly quick vegetation to the seed, which in a few days will be up and out of all danger from the fly. At all events, sow not till it rains; it is better to wait a month, or even longer for rain, than to sow (merely for the sake of sowing about the usual time) when the ground is parched with heat. By the scorching of the sun, the oil, and vegetative quality of the seed, are exhausted; and the few weak plants that come up will be destroyed by the fly before they can attain strength to put forth their rough leaves. The fly infest the ground abundantly in dry hot weather, but do no injury in rain.

The falling rain will sufficiently wash the turnip seed into the ground without harrowing it in, which, instead of merely covering, too often buries this small seed at so great a depth as never afterwards to get above ground.

I am, your's, &c.

Exeter.

C. GUILLET.

## ARTICLE XLV.

*On the different Species of Rhubarb.*

S I R,

I Did not know that the *Rheum Rhaponticum* was now judged by any to be the officinal rhubarb. The famous Naturalist and Siberian Traveller, M. Pallas, seems to have determined the *Russia* rhubarb to be the *Rheum Palmatum*; and that the *Chinese* rhubarb is the species which *Linnaeus* once thought to be the true rhubarb, and described as such in the *Amoenitates Academicæ*, under the name of *Undulatum*.

I have difficulty to believe that *Monf. Pallas's* intelligences on this subject are not to be depended on; though, indeed, it is not strange, that two or more species of the same genus should produce roots but little different in their powers; which is the case in the instance before us of the *Palmatum* and *Undulatum*, if one may depend on letters and authors. And I have been informed, that these two species, planted near each other, will produce a mongrel plant, the seeds of which are not fertile; and I should not be surprized to hear that the root of this *hybrid* excelled that of its parent plants.

Bergius,

*Bergius*, the latest author on the *Materia Medica*, that is come to my hands, tells us, that the *Chinese* get up their rhubarb roots in winter. He himself advises the taking them up in autumn, and says they require to be eleven or twelve years old.

But I have learned that Dr. *Hope* thinks them sufficiently good at the end of four or five years; and the author above-mentioned tells us, that the young roots are more purgative, and that the older ones are more astringent:

Experiments only can determine what season of the year is preferable to take up the roots in. I cannot speak from any knowledge on this subject; but should incline to give it in favour of the spring, or the time before the plant begins to push its leaves; though I am sensible that this will not hold in these bulbous or tuberous kinds, which form a new root annually, as soon as the plant is perfected.

I am, very respectfully,

Your humble servant,

March 2, 1783.

R. PULTENEY.

ARTICLE



## ARTICLE XLVI,

*On the Culture and Increase of a new Species  
of Horse-Beans sent from Holland.*

GENTLEMEN,

ON the 12th of March last, I received from a Member of your Society, two quarts of a new kind of small horse-beans, sent him from Holland. They weighed exactly four pounds. As I did not receive them till all my other beans were planted, I had but little time to prepare the land for this experiment.

The spot I fixed on was part of a very large field intended for turnips, and measured nearly forty-five perches. As it was very long and narrow, the soil varied greatly, one end being a heavy sand, apt to run together and bind, when much rain suddenly follows the time of working it. The other end I am quite at a loss to name, it being a rude compound of clay and rugged stones, whose surface for roughness resembles a cinder, and greatly obstructs the point of the share in ploughing. In general this land is very wet, but this season so dry, that it was ploughed with great difficulty; and this part only had a small  
heavy

quantity of dung in consideration of its extreme poverty.

The whole was a wheat stubble ploughed in before Christmas, and on the 15th of March ridged up in order to be planted, which was performed on the 17th with the chain in rows three links and a half distant, and two links from bean to bean in the rows ; for they were planted singly, so that a space of seven square links, or three square feet, was allotted to each bean.

When about six inches high, they were hoed, and earthed up a little, but in a very bad manner, the ground being rough and hard, which rendered the work very tedious.

The weeds grew amazingly, but notwithstanding they possessed so large a share of the ground, the beans were in general five feet high, having from twenty to seventy pods on a stalk. I counted the number from one single bean, and found them to be 114, which allowing on average three beans and a half to a pod, is 399.

The crop was cut on the 28th of August ; but being very green, they were continued in the field to the 4th of September, and were then  
in

in fine order. I had them thrashed about six weeks ago, and they yielded thirty-five gallons Winchester measure, and weighed 296 lb. nett of fine beans, not much the worse for being cut so green, though I apprehend somewhat less both in weight and measure.

I now beg leave to observe,

*First*; That as greater regard was paid to the value of the seed than to that of the land, a much less quantity was sown than might have been raised on the same space of ground. And as little benefit was likely to be derived from tillage or manure, I flatter myself the *air* might in some degree supply the deficiency by strengthening the blossoms, and preventing blights.

But whoever makes small experiments of this kind, lies under greater disadvantages than would attend them on a larger scale, especially where the proportion of seed is so small, that every grain destroyed by vermin, &c. is missed. And altho' seventy-four for one is a great increase, yet fifteen bushels and a half per acre is not a profitable crop of beans.

*2dly*; I judge this species of beans, in general, to be a great bearer, and hardy, as the dry weather

ther did not apparently affect them, although they stood so thin.

As this bean puts forth a strong stalk, and shoots high, it will require to be planted thinner than others, and as early as possible; otherwise I fear that in wet summers it would not ripen in due season for a wheat crop to follow, especially on moist land. Perhaps a bushel on an acre may be fully sufficient.

I am, &c.

Grittleton, Wilts.  
Oct. 29, 1779.

JAMES SARGENT.

#### ARTICLE XLVII.

#### *Observations on Dr. TISSOT's Letter to Mons. HIRZEL.*

GENTLEMEN,

HAVING lately read Dr. Tissot's letter to Mons. Hirzel, in answer to Mons. Linguet's treatise on bread and bread-corn, gratitude seemed to require not only an acknowledgment of that great man's abilities, but also the just tribute due to the philanthropy of his amiable disposition,

disposition, which renders him ever studious to promote the good of mankind. Not forgetting at the same time, the thanks due to the Bath Society for their laudable attempt to encourage, extend, and promote, the knowledge of Arts so universally beneficial as those of Agriculture, Planting, &c.

One cannot help being surprized that this great man should enter into the minutiae of a science so remote from that of his profession, with such accuracy and discernment; for how much soever he may have mistaken some historical passages relating to his subject, his reasoning from facts and experience are certainly just, and applies as truly to the practice of Great-Britain, as the country in which he wrote. The following remark is very important and just, and well worthy the practical Farmer's attention here, as well as in Switzerland. He says,

“ I am persuaded from the best Treatises on ~~OE~~conomics, from the observations communicated to me by persons fully experienced in this matter, and from the soundest philosophical principles, that in sowing less corn, and putting the remainder of the lands to some other culture, there

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would

would be as much grain reaped, and also many other useful productions."

Had this gentleman professionally studied the æconomical state of Agriculture in these our countries, he could not have pointed out more directly an evil which has long militated against the general interest of Great-Britain; I mean that of giving encouragement to the planting of more wheat than could be disposed of, without laying a heavy tax upon the people at large; and not only at a price too by which the community have been great sufferers, but greatly, in many instances, against the interest of the farmers themselves, who have been induced to depart from their usual routine of crops, to plant wheat in lands not proper for that grain, and to neglect those which it would have borne with great advantage; by which both their own, and the interest of the public have been greatly injured; for it is a certain fact, that in some years, when 200,000*l.* have been paid for bounties, we have been obliged to import oats to the amount of 500,000*l.* amounting together to 700,000*l.* A sum considerably above half what the wheat was sold for, though it actually stood the grower in above three times the money.

It

It seems to have escaped the notice of all the writers on the subject, that whatever article of commerce is exported at a price below what it stands the grower or manufacturer in, a real substantial loss must be sustained by somebody. Now, supposing the average cost of wheat to the farmer is four shillings a bushel, and it be exported at three shillings, there is a loss of twenty-five per cent. in the first instance; and seven-pence halfpenny per bushel given by the bounty amounts to above twenty per cent. more, together above forty-five per cent. loss: Whereas, if kept till the next year only, it probably might have sold for so much gain, as often would have been the case. But this is wide of the first intentions of this paper.

Dr. Tissot, after describing the method of practice pursued by the wise Kliock, (as he, I suppose, very justly calls him) wishes him to add some corrections and amendments to his system of Agriculture.

*First*; Never to sow wheat with rye. The impropriety of this practice is too glaring to need enlarging upon.

S 2

*2dly*; Never



2dly; Never to let grafs stand too long before it is mown; *first*, because it has been fully proved, that hay is lefs nourifhing to animals, when it comes to feed; and *secondly*, as foon as the blof-fom drops, the plant is nourifhed wholly from the roots, which impoverifhes the land. This, though not lefs certain than the former, is in general little attended to by the farmer; indeed moft of them act in direct repugnancy to it, for it is a maxim almoft univerfally received, that the largeft crop of every kind is the beft. Therefore in hay and fodder, quantity in general is preferred to quality. Often the former has fo much the preference of the latter, that the defire of a large crop procrastinates the cutting till the crop is fpoiled, and in fact the whole crop loft; for it too often happens that it is not worth the expence.

What Mr. Tull asserted of what he called his virgin-hay (speaking of faintfoin) may with equal truth be faid of all kinds of grafs whatever; every fpecies of which, whether natural or artificial, intended for fodder, are in the higheft degree of perfection for that purpofe when the plants are in bloom. They then contain all the virtues of the plant in its higheft perfection; and one load cut at that feafon, if well cured, is worth more than

two that stand till the flowers are dropped, the bottom turned yellow, and dying, which in that case contracts a rank disagreeable smell that can never be entirely removed in the curing. And if in that state bad weather should happen, the feeds would be mostly dropped before it could be got to the rick, and the hay not better than barley-straw, if so good.

I would therefore advise every one, especially all who make hay for their own consumption, to cut as soon as the grass is fairly in bloom, if the weather will by any means permit.

His last remark is respecting Sheep, which requires some consideration. He recommends the keeping a greater number of sheep. This must ever be determined by the nature of the soil, and the extent of the farm. He cautions against keeping them too hot, which is certainly right, for in extreme hot weather they suffer greatly. But it does not follow, as he asserts afterwards, upon the authority of Mons. d'Auberton, "that sheep are neither hurt by cold nor by snow, nor rain." That they seldom suffer by a dry cold, though very severe, is very certain; nor by snow, unless it continues so long as to injure them, by

depriving them of their food; but heavy or long-continued rains are certainly very injurious to them, especially to lambs in October and November, when the winter rains set in. Of the truth of this I am well assured from my own observation.

In autumn 1780, I went into the north of Devonshire, to spend a few weeks with a gentleman who cultivated his own estate. In October, when the cold rains came on, for many days running, he had one or more young sheep or lambs brought in, either dead, or in a dying state. They were one and all much swoln in the body, without any other visible difference from those that were well. In the field, I observed, they were much inclined to lie still, till roused and put up. I had several of them brought home and laid by the fire-side, and made several experiments upon them, but without success. At length, I had two or three of them opened, to see if I could discover any internal cause of their malady. All the viscera appeared to be sound and perfect, without any the least sign of disorder; only, as I said, the body was greatly swoln.

When the knife entered the belly, there flew out a great quantity of rarified air with a considerable

derable noise, upon which the body immediately fell to its natural dimensions. As no unsoundness appeared in any of the viscera, I conceived the expansive vapour was probably the cause of the disorder, and the effect of obstructed perspiration, occasioned by the cold rains so common at that season. Upon enquiry, I found the disorder was common in that country at that season of the year, and at that time was very rife for many miles around, which confirmed my suspicion as to the cause of the disorder.

About sixty of these lambs remaining, I proposed to the hind (bailiff) to try if we could not preserve the remainder by sheltering them from the cold rains and damps of the night, by putting them into an airy barn, which was contiguous to the fields, to remain there till it might be thought proper to let them out in the morning. This effectually answered the purpose, for not one miscarried afterwards. In three or four days time, their coats, which appeared of a washed sickly white while they lay out, became a natural healthy-looking yellow, and they appeared as lively and healthy as at any time of the year. I should therefore hope, if this method be pursued, many thousands may be preserved by its means.

Were I a farmer possessed of a considerable flock, I would certainly erect a proper building for the purpose. It might be done at very little expence, and a large quantity of manure got from it, especially if the floor were covered with an absorbent earth, or sand with straw over it.

By this means, all their urine and dung might be saved, which would be a great acquisition ; as in common, for the most part, it is dropped under hedges, or upon the surface of the land, where the sun and wind readily exhale its fertilizing juices, with little or no remaining benefit to the soil.

Such a building would be as salutary a defence against the scorching and wasting heats of summer, as the unhealthy and stagnating rains of winter. In deep snows it would be a very proper place to fodder in, and salt-licks might be provided under its cover for the sheep at all times to resort to. 'Tis said in Spain these salt-licks are common, and the cattle resort to them either through instinct, or from having contracted, by example and habit, a liking to them.

Such a building would also be very useful for large cattle, with an opening on the most sheltered

tered side large enough for two to run in a-breast without injury. It might be thatched and wattled (herdled or flaked) on the sides and ends, which would be warm enough, the cattle left at liberty to go in and out at pleasure; by which means they would equally avoid the violent heat and hasty storms of summer, and the soaking rains and chilling blasts of winter.

This method is, perhaps, the very best means of keeping cattle healthy which are not in constant work, and of collecting a very large quantity of manure on or near the spot where it is to be used. For the dung and stale which is dropt under hedges, or in the field promiscuously, is of very little use in ameliorating the soil.

I conclude with every good wish for your laudable undertaking; to the promotion of which I should esteem myself happy to be able in any measure to contribute.

I am, Gentlemen,

Your most obedient servant,

Manchester,  
April 10, 1782.

JOS. WIMPEY.

## ARTICLE XLVIII.

*General Hints relative to Agriculture.*

[By an Honorary Member.]

GENTLEMEN,

I MUST acknowledge my long remissness in making you any return for the honour you have done me, by adding my name to the list of honorary members; but the distance of my residence, added to an indifferent state of health, must plead my excuse. But in order to convince you that the important objects of your attention have not wholly escaped mine, I beg leave to trouble you with a few general hints on husbandry, which are entirely submitted to your disposal.

The great outlines of good husbandry are the same in all counties, and will admit of little variation. It is in *lesser* matters that any material difference ought to be made. And as these differences are local, they can only be judged of properly by the respective inhabitants.

The vast tracts of waste land which still remain in almost every county, are a public reproach to  
the



the grand police of this nation, and evince a degree of ingratitude to the great Author of Nature; who has blessed us with the means of rendering them sources of wealth to numbers, and the theatre of employment to our poor labourers; many of whom, from the decline of our commerce, are almost destitute of bread.

The low lands in most counties are best adapted for pasture. The grasses most natural to them are better kinds than in elevated ground. Those which, from being situated along the sides of rivers, are most rich and least liable to be affected by drought, should never be ploughed, unless for hemp, flax, or cole. [rape.] For corn will sustain drought better, even on high lands, than grass of any kind worth standing for hay.

Lands that are moderately situated with respect to height and water, are best for corn; but such lands ought also to be laid down to grass once in ten or twelve years. By thus treating them they recover their strength, which, through a long course of ploughing, will, in spite of all your manure, become feeble and exhausted. I am of the opinion, that if most arable lands were laid to grass once in six years, greater profit would

would arise to the farmer. For if we compare the produce of forty acres, that are an equal number of years in grass and corn, with the same extent of land equal in quality, and successively ploughed for the same length of time, we shall find that (besides the extra goodness of the crops gained by the former course) the land thus managed requires much less seed, and there is much less consumption of corn on the farm than in the latter. To this it may be added, that every pound of flesh added to the cattle fed in the grass years, is worth two or three pounds of grain, both to the farmer and to the public. Therefore, if, on the lands in corn and grass alternately, the crops of corn are only one-fourth better than on lands always in corn, this plan is far the most beneficial, and produces a greater plenty of food for society.

When corn is raised on a soil naturally wet, winter grain ought to be the principal object of the farmer's attention. For, on such situations, the natural wetness of our winters will often render it almost impossible to get the land in a proper condition to be well ploughed for spring corn. The Lincolnshire barley will answer very well sown on a winter sward; as will oats, and some kind of pease.

In

In every case, when you intend to lay down, sow grafs seeds with the last crop. This method will enable the farmer to deal in and to breed a larger number of cattle than he otherwise could do. The reason of this is evident. As his cattle are employed only a part of the year, he may buy and sell with advantage, and without loss of labour.

The providing of food for society is, of all employments, the most important, and the most honourable: By other occupations, the wealth and the power of a state may be more rapidly increased; but this is necessary to its very existence. In proportion to the largeness of the quantity of eatables brought to market, the more easily is the manufacturer maintained, of the less value is his labour, and the lower the price of the manufacture that he works. By these means the sale of the goods made increases abroad, and their improvement is encouraged at home.

Of all articles in trade, none is so valuable as corn. It is a commodity of all others the most important. A nation that supplies another with corn, makes that other pay her labourers, and contribute to the increase of her wealth and power.

These

These are *obvious* truths, but perhaps the revival of them in a work of the kind your are about to publish may not be wholly useless.

Wherever Agriculture flourishes in the greatest perfection, it is generally carried on to more advantage by tenants, than by the owners of lands; because the customs of the country direct the management; all depends on care, attention, and industry, and these are oftner found in tenants than in proprietors. In this case it is also of little consequence whether the farms are large or small. But where Agriculture is little understood, and badly practised, it is generally best carried on in large farms, and by the owners of them.

Improvements must first begin among men of property who have large farms. The tenants of small farms cannot run risks, by making untried or doubtful experiments; but the tenants of large farms may, as they are generally more wealthy, and more capable of judging from close observation. A little loss by unsuccessful experiments will not materially injure them; but still it cannot be expected that they will make improvements equal to land-owners, who are less influenced by prejudices and customs, and are better acquainted

acquainted with improvements made in distant places.

There appears to be a great remissness in our common farmers' general method of treating their summer fallows. After these have been once ploughed, they are often let lie without a second ploughing till many of the weeds come into flower, and even perfect and shed their seeds. By this shameful neglect a fresh crop of weeds is sown, and occasion a great deal of future labour. Many farmers indeed take considerable pains, and are at much expence, to clear their lands of weeds when they spring up; but few, if any, take much care to prevent their seeding. Indeed by this neglect being so general, and extending even to their very dunghills, one would be apt to think they forgot, or knew not that weeds sprung from seeds of the same kind. I have frequently heard them complain that their fields, (when contiguous to commons that abound with thistles) are over-run with thistles: And yet suffer them to be annually sown with this pernicious weed, rather than be at the trifling expence of employing a poor man two or three days in cutting them down on the common before their seeds ripen. How truly ridiculous is such conduct! Nor is it less so to let their dunghills

hills remain covered with thistles, docks, and many other weeds, till they have all shed their seeds, and then wisely sow their own lands with them when the manure is spread.

The same may be said of suffering such quantities of them to stand and shed their seeds, many of which the wind disperses into the adjoining fields.

In the latter case, the cutting and burning them would be well repaid by the ashes. I have known poor men in this county, who, during the months of July, August, and September, have earned 2s. 6d. a day by cutting and burning weeds in our highways, and felling the ashes; which, if the weeds are burnt without being suffered to flame, are very fine manure, especially for cold wet lands. I observe you have very judiciously offered a premium on this head, which will doubtless have a good effect.

The practice of sowing *spring wheat* has of late years increased in many places, but not much with us, although in the few instances tried it has succeeded very well. This method has one advantage, to wit, that of affording time for the land

to receive the influence of frosts, and to be got in finer tilth than it could be if sown in autumn. The plants are seldom so vigorous, but the ears are as well filled, and the grain as large, as when sown in October or November. This, on the whole, seems an advantage; for if early sowing be a means to increase the bulk of the straw, it must for the same reason lessen the quantity of grain. Nor is this all: Autumn sown wheat is in greater danger by spring frosts. The frost affects every plant more or less; and the farther it is advanced in its growth the more frost injures it. A degree of frost destroys a plant of wheat when near or in the ear, which affects it very little in the winter.

I think the best season for sowing wheat in autumn, is from the 1st of October to the 10th of November. After that time there is great danger of being interrupted by heavy rains or frost; both which are very prejudicial to the seed in the first stages of its vegetation. In proportion as the land is more clear and fertile, a less quantity of seed is necessary. The reasons for this are too obvious to need explanation.

I am, your very humble servant,

Norfolk, March 6, 1783.

S. B.



## ARTICLE XLIX.

*Observations on the best Method of restoring worn-out Soils without Manure.*

[From a Gentleman Farmer in Dorsetshire.]

GENTLEMEN,

THE first thing necessary on such lands is, immediately after harvest, to turn them up with the plough as deep as possible. In order to do this effectually, it will sometimes be needful for a second plough to follow the first in the same furrow; which will throw the mould over, and bury the stubble and weeds. In this case there will be a new soil uppermost, which being fresh to the air, will receive much greater and more lasting benefit from the sun, the rain, and the frosts, than it otherwise could do, as thereby it will attract a greater quantity of the nutrition which these afford. The stubble and weeds being by this method of ploughing buried deep, will much sooner rot than when just covered. In this state the ridges will lie high, and if the land be wet or of the brick-earth kind, will be full of clots or large lumps.

No

No time should now be lost by delaying to render this newly turned up soil as fine as harrowing can make it. I know in this particular my judgment will be called in question by numbers. Common farmers will say, "To what purpose is all this expence and labour, when, if the land be suffered to lie in its rough state through the winter, the frost and the rains will do the work for you?" But this is the language of the sluggard, and the inexperienced husbandman only.

I am convinced, by repeated experiments, close observations, and plain reasoning on known facts, that lands which are made fine before the sharp frost and winter rains come on, will receive a much greater share of their influence than any other.

If the land be left in a rough state, there is seldom time for the rains and frost to affect more than the outside of the large clods or lumps; the outside will indeed be pulverized, but the *middle* of the lumps, wherever they are large, will be found nearly in the same hard stiff state as when turned up by the plough. Hence it must appear to every one, that in this case the benefit of air, winter rains, and frosts, on lands thus left, is partial; and the consequence is, that harrowing

it in the spring, when these are over, is too late for its receiving the benefit which would have accrued from them, and the power of vegetation is not so vigorous.

But to make winter fallows as fine as they can be in autumn, and then ridge them up in that pulverized state, is acting most agreeable to nature. The greatest possible quantity of surface is by this means exposed to the atmosphere; and the sand is left in a state wherein the rains and the frost are most easily admissible. They will then penetrate and enrich the whole mass to a greater depth.

If the frost penetrates a quantity of earth, formed into a large hard clod, *partially*, on account of its bulk and hardness, (which is always found to be the case) it is evident that the same clod broken into four parts would be thereby penetrated four times as much, or, in other words, four times the quantity of earth would be affected by it; and on a thaw be pulverized. For we find, that after the breaking up of a severe frost, all the small clods crumble easily into powder; while the large ones are only made smaller by the crumbling off of their surfaces to a certain depth.

By

By this deep ploughing which I have recommended, the worn-out soil being turned in, the second stratum or fresh earth is now uppermost; and having, by being made as fine as it can be in autumn, been exposed to the air, the rain, and the frost during winter, is thereby sweetened and cleansed of its impurities; and thus become a new fresh fertilized earth, in the best possible state for vigorous vegetation.

Many farmers will probably object to this method, on account of its being attended with a little extra expence: But I wish them to consider, *first*, that this expence is more in appearance than reality, for less labour is requisite in the spring; and *secondly*, that it will be amply repaid by the goodness of succeeding crops.

About seven years since I made a comparative experiment of this kind on a field of ten acres, the soil of which was equal as possible in goodness. The one half of this field I left after ploughing in its rough state, the surface being covered with large hard clods. The other half I made as fine as possible by harrowing with ox harrows, and beating in pieces the hardest and largest clods which the harrow would not break.

In the spring, the part I had harrowed was much finer, without any additional labour, than I could render the other (which was left in its rough state) by repeated harrowings; for the rain and the frost having not penetrated the middle of the large clods, they had received no benefit therefrom, and were as hard as bricks, being only lessened in size.

I sowed the whole field with barley the last week in April, and threw nine pounds of broad clover in with it. On harvesting it, I kept the crops separate: The part left rough produced twenty-four bushels per acre; the other thirty-one; the latter by much the finest sample. The crop of clover next year was equally in favour of the method I am recommending, being heavier by near half a ton per acre.

The extra expence on this part was only about eight shillings per acre; the extra produce yielded an extra profit of more than twenty shillings per acre.

I am, Gentlemen, your's, &c.

A LANDHOLDER.

## ARTICLE L.

*On the comparative Utility of Oxen and Horses  
in Husbandry.*

Rougham, near Bury, Suffolk, Dec. 17, 1781.

GENTLEMEN,

AS one of your queries to the High-Sheriffs respected the comparative utility of horses and oxen in husbandry, I wish to submit the following facts to your consideration:—

About five years ago, I took some land into my occupation, and having found the expence of horses very great, I determined, somewhat more than two years ago, to make trial of oxen, and bought one pair. At that time, I am almost certain, there was not an ox worked in this county; on which account my workmen added much to the trouble of breaking them, by their obstinate prejudices against the use of them.

At last I was fortunate enough to select a labourer, who, though totally unused to them, was willing to take proper pains to break them. By  
his

his good treatment and temper, they soon became tractable, and as handy both at ploughing and carting as any horses.

Being well satisfied with their performance, I resolved to dispose of all my draft horses, and substitute oxen in their stead. I have now completed my plan, and have not a single cart-horse; but the work of my farm (which consists of upwards of one hundred acres of arable land, and sixty of pasture and wood) is performed with ease by six oxen; together with my statute-duty on the highways, timber and corn, carting, harrowing, rolling, and every part of rural business. They are shod constantly; their harness is exactly the same as that of horses, (excepting the necessary alterations for difference of size and shape) they are drove with bridles, and bits in their mouths, and answer to the same words of the ploughman or carter as horses, and as readily. A single man holds the plough, and drives a pair of oxen with reins; they will regularly plough an acre of land every day, and in less than eight hours time; I believe they will do it in seven, but I would not assert more than I know they perform.

I have a small plantation, in which the trees are planted in rows ten feet asunder; the intervals are  
ploughed



ploughed by a single ox with a light plough, and he is drove by the man who holds it. I mention this as an instance of their great docility.

My oxen go in a cart single, or one, two, three, or more, in proportion to the load. Four oxen will draw eighty bushels of barley, or oats, in a waggon, with ease; and if they are good in their kind, will travel as fast as horses with the same load.

I frequently send out eighty bushels of oats with only three oxen; and one ox with forty bushels in a light cart, which I think of all others the best method of carriage. My workmen are now perfectly reconciled to the use of oxen; and the following reasons determine me to prefer them greatly to horses:—

*First*; They are kept at much less expence. Mine never eat corn or meal of any sort. During the winter, they are kept in good order for work upon straw, with turnips, carrots, or cabbages; for want of either of the three latter, I allow one peck of bran a day to each ox, whilst in constant work. When my straw is finished, and the spring advances, they eat hay; and if they work harder than common in the seed time, they have bran beside.

beside. When the vetches are fit to mow and give them in the stable, they have nothing else. After the day's work in the summer they have a small bundle of hay to eat, and stand in the stable till they are cool, and then turned into the pasture.

I am of opinion, that the annual difference of expence in keeping a horse and an ox, each in condition for the same constant work, is at least four pounds.

*Secondly;* The value of a horse declines every year after he is seven years old; and is scarcely any thing if he is blind, incurably lame, or very old: But if an ox is in any of those situations, he may be fatted, and sold for much more than the first purchase; and will always fat sooner after work than before.

*Thirdly;* They are not so liable to illness as horses. I have never had one indisposed.

*Fourthly;* Horses (especially those belonging to gentlemen) are frequently rode by servants without their master's knowledge, and often injured by it. Oxen are in no danger of this kind.

*Fifthly;*

*Fifthly*; A general use of oxen would make beef, and consequently all other meat, more plentiful; which I think would be a national benefit.

That it may not be thought, that a pair of oxen will plough an acre of land in a day only upon a very light soil; I must add, that the greater part of my arable land is too heavy to grow turnips to advantage. When my lighter lands are in fine tilth, I make use of a double plough; a single man holds it, and drives one pair of oxen, and will plough two acres a day.

I am well aware, that the method of working oxen with a yoke spares a considerable expence in the article of harness; but they move so much more freely with collars, and can be used with so much more advantage singly by the latter method, that I think it far preferable.

After experience has inclined me to give the preference to oxen, I will not omit in my account the only material inconvenience I have found in working them; which is, they are troublesome in shoeing, at least I have found them so in this country; and, I believe, chiefly because my smith never shod any before. I have them confined in  
a pound

a pound whilst they are shoed, and a man attends the smith. However, I think this disadvantage amply recompensed by more material advantages; and can with great truth affirm, that the longer I have worked oxen, the better have I been satisfied with them.

With great respect, I am, Gentlemen,

Your most obedient servant,

R. KEDINGTON.

#### ARTICLE · LI.

Sir JOHN ANSTRUTHER having very politely presented to the Society a complete Model and accurate Drawing of a Drill-Plough of his own Construction, for sowing the different kinds of Grain, was pleased also to communicate therewith the following observations:

GENTLEMEN,

THE slow progress which the Drill-Husbandry has made in many parts of Great-Britain since Mr. Tull's time, has principally been owing to the want of proper drill-ploughs; there being few yet contrived which are not too expensive, or of too nice and complicated a construction to be made or repaired by common workmen.

This

This has also prevented trials from being made of the drill-culture, in so general a manner as to determine, by proper experiments, whether or not it was so advantageous as Mr. Tull has stated it to be.

It is more than thirty years since I began to use drill-ploughs; but finding those I first procured good for nothing, and not being able to get a workman who could make one on Tull's plan, I found myself obliged to abandon the drill-husbandry.

Before drilling can become general, drill-ploughs must be simple, and such as a common ploughman, accustomed to use strong instruments, can use without breaking; and such also as common workmen can easily make or repair.

Mathematical accuracy, however, is not required for delivering the seed; for it matters very little whether there be a quarter of a peck more or less sown, if it be delivered with tolerable regularity.

Some years ago I had a plough made of the same kind with the model and drawing which I  
have

have the honour of presenting to your Society. It was made by a common ploughwright, and sufficiently strong for any land made fit for turnips or wheat. I have now used it for eight years, without its requiring any repair. It has been tried on very rough ground unfit for sowing, in order to ascertain its strength.

Last year having read Mr. Forbes, upon the extensive practice of the new husbandry, and some other authors, who gave a more clear and distinct account of the different operations in drilling than had heretofore been given, I wished to try them, and to adopt my plough to sow the quantities therein directed. It was, however, adjusted to sow a *smaller quantity*, and the seed was not steeped.

Not having ground so proper as I wished, it was drilled on the side of a field, the soil of which was light and sandy, and in such bad order, that the preceding crop was a very indifferent one. It was therefore manured with a compost dung-hill.

After cross-ploughing and manuring, it was laid into four and a half feet ridges, then harrowed and drilled with one peck and a half of wheat on an acre and a quarter, which is nearly  
one

one peck and a fifth per English acre. It was drilled the 27th of October, and rolled after drilling. The crop was late in its appearance, and very backward in the spring.

March 31st, it was horse-hoed one furrow *from* the rows.

April 8th, it was hand-hoed and weeded in the rows.

25th, horse-hoed again, laying a furrow back *to* the rows.

May 15th, hand-hoed the second time.

June 2d, horse-hoed *from* the rows.

June 12th, hand-hoed the third time.

July 14th, horse-hoed *to* the rows.

At this last hoeing, as many of the ears were beaten down into the intervals by wind and rain, a man went before the horse-hoe, and turned the ears back into their proper place.

The crop, when reaped and threshed, yielded me thirty-six bushels on one acre and a quarter, which is twenty-eight bushels and three pecks per acre; and the produce from one peck and half ninety-six for one.

As



As the produce appeared so great, from land in such bad order, it was carefully measured again, and found to be right. But this increase, though great, was not so large as Mr. Crake of Glasgow had without dung.

Mr. Randal says, "It is an experimented fact, that on a fine loam, exquisitely prepared, one hundred and forty-four bushels have been produced from one acre. And, I believe, it is not known what the increase may be brought to in rich lands by high cultivation."

Some years since, I had beans dropt alternately with potatoes, at two feet distance in the rows, which were three feet apart, and ploughed in the intervals. The land adjoining was sown with beans and pease, which were a good crop; but those sown among the potatoes a better one. I pulled one stem of the beans planted with the potatoes, which had three branches rising from the bottom, and it produced two hundred and twenty-five beans. In all the trials of drilled beans, most of the stems had two branches, with many pods upon each.—From these and other instances, I believe it is not yet known to what increase grain may be brought by drilling, good cultivation, and manure.

Horfe-

Horse-hoeing is certainly preferable to close drilling or hand-hoeing; but the latter is superior to broadcast.

Horse-hoeing the full depth increases the crop, by making it tiller or branch more than it otherwise would do; and the advantage is distinctly observable every hoeing, by the colour of the grain. It prepares the ground for the next crop, at the same time that it increases the crop growing, which hand-hoeing does not, although it may destroy the weeds.

Thus drilled ground is kept in a loose open state to receive the benefit of the influence of the air and weather, which broadcast has not; and it is evident, from certain experience, that crops may be drilled many years to good advantage without manure.

Suppose the crops only twenty bushels per acre, what course of broadcast crops will give 5l. an acre for the course?

But suppose they are dunged the same as any ground in the most approved course, there is the greatest reason to expect as much as in the above

experiment, which is twenty-eight and three quarters, and at 5s. per bushel amounts to 7l. 3s. 9d.

Calculations may be of service to those who wish to try drilling, and have few books to direct them.

One acre is ten chains long, of 660 feet, or 220 yards long, and one yard broad, containing 4840 square yards. Then if the ridge is four feet six inches, this makes fourteen ridges, and three feet to spare. This length of 220 yards, multiplied by fourteen, (the number of ridges) gives a length of yards 3080, to which add 146 for the spare three feet, and it will be 3226 yards. And as two rows are drilled on a ridge, the number of rows will be in length 6452 yards; but as a deduction of 172 yards must be made for the head ridges, suppose three yards each, &c. the whole length to be sown will be 6280 yards clear.

Now, a gallon [Winchester] holds about eighty thousand grains. The quantity recommended to be drilled by Mr. Forbes and others, being six gallons, or two-thirds of a bushel per acre, is nearly seventy-eight grains to a yard, or twenty-six to a foot. But in my experiment, by this calculation,

calculation, it was only about eleven grains to a foot; which is quite sufficient, if the seed be good, and it be not destroyed by vermin.

Now with regard to the quantity of land this drill-plough may sow; if a horse walks at the rate of two miles per hour, he goes sixteen miles in eight hours, or 28,460 yards. As he sows two ridges at once, this is seven lengths and two-thirds per acre, or 1686 yards to sow an acre, being nearly seventeen acres in a day.

Four horse-hoeings are calculated equal to two ploughings. In plain ploughing they suppose the ridge is ploughed with four furrows, or eight for twice ploughing. The four horse-hoeings are eight furrows, equal to two ploughings.

Mr. Tull directs four hoeings, and Mr. Forbes five.

*First*; In November, when the plant has four blades.

*2dly*; In March, deep, and nearer the rows than the former; both these hoeings should be *from* the rows.

3dly; Hand-hoed when it begins to spindle, if the earth be crumbly, *to* the rows.

4thly; When it begins to blossom, *from* the rows, but as near to them as in the second hoeing.

5thly; When done blossoming, to ripen and fill the grain, *to* the rows.

The last hoeing Mr. Tull does not direct, but Mr. Forbes advises it, as being of essential service in filling the grain, and saving trouble in making the next seed-furrows. They advise the patent or sowing-plough for horse-hoeing; and the expence is calculated by Mr. Craick at one guinea per acre, reaping included.

But let us suppose the following, which are the prices in the county I live in.\*

	£.	s.	d.
Ploughing to form the ridges - -	-	0	4 0
Harrowing - - -	-	0	0 4
Four hoeings, equal to two ploughings	-	0	8 0
Sowing - - -	-	0	0 4
Hand-hoeing twice - - -	-	0	8 0
Seed, one peck and half, at 5s. a bushel	-	0	1 10
Whole expence per acre - -	£.	1	2 6

\* Near Edinburgh.

With

With respect to the rent of land, and the expence of cutting and getting in the crop, it will be no more than as if the crop were sown broadcast.

I have the honour to be, Gentlemen,

Your very humble servant,

Bath, 1782.

J. ANSTRUTHER.

P. S. You will remark, that this double drill-plough sows two ridges at a time, the horse going in the furrow between them, and of course does not tread upon the ground intended to be sown; which with a single drill must be the case, and does much harm by the horses feet sinking and making holes in the fine ground, which retain the water, and hurt the wheat when young.

# ARTICLE LII.

## *To preserve Turnips from Frost.*

[By a Gentleman Farmer.]

Mr. RACK,

**I**N answer to your enquiry, whether we have adopted any method of preserving Turnips from the frost; or for feeding cattle late in the spring;

U 3

and

and if so, what those methods were? I beg leave to observe, that nothing of this kind is yet come into general practice in this county. With respect to preserving turnips from such severe frosts as we had this last winter, especially when there has not been snow enough to cover them, I believe it would be utterly impracticable, unless the turnips were drawn previous to such frosts.

This would on the whole never answer the farmer's purpose, as the certain trouble and expence of housing or stacking them would far exceed the advantage, even in a hard season; and, in mild winters, would be entirely lost.

To preserve them for late spring-feed is not so difficult an undertaking. Divers methods have been tried; and among the rest, that of drawing and burying them in sand; but this has not answered, for the following, among other reasons:—

Turnips are a very juicy root; and although sand be perfectly dry when thrown among them, yet when packed together in large heaps, they naturally sweat, and communicate a moisture, which, with the hot quality of the sand, raises a still greater heat; and as warmth and moisture  
are



are two qualities which greatly promote vegetation, the vegetation of these roots is the first thing that renders them useless. They will grow till the growing quality is exhausted, and then, by putrifying, become quite unfit for food.

The best method of preserving them that I have heard of, and which has been tried with success by some of our best farmers, is, to stack them up in dry straw; a load of which is sufficient to preserve forty tons of turnips. The method is easy, and as follows:—

After drawing your turnips in February, cut off the tops and tap roots, (which may be given to sheep) and let them lay a few days in the field, as no weather will then hurt them.

Then, on a layer of straw next the ground, place a layer of turnips two feet thick; and then another layer of straw, and so on alternately, till you have brought the heap to a point. Care must be taken to turn up the edges of the layers of straw, to prevent the turnips from rolling out; cover the top'well with long straw, and it will serve as a thatch for the whole,

In this method, as the straw imbibes the moisture exhaled from the roots, all vegetation will be prevented, and the turnips will be nearly as good in May as when first drawn from the field. If straw be scarce, old haulm or stubble will answer the same purpose.

But to prevent this trouble and expence, perhaps farmers in all counties would find it most to their interest to adopt the method used by our neighbours the Norfolk farmers, which is, to continue sowing turnips to the latter end of August, by which means their late crops remain good in the field till the latter end of April, and often till the middle of May.

The advantages of having turnips good till the spring feed is generally ready, are so obvious and so great, that many of our farmers (although at first prejudiced against the practice) are now come into it, and find their account in so doing.

I wish these few hints may prove in any degree useful, and am, wishing all possible success to the Bath Society.

Your very humble servant,

Suffolk,  
March 1, 1780.

W. P.

ARTICLE

## ARTICLE LIII.

*To prevent the Blight in Potatoes, and to  
make a Cow a good Milker.*

[By Mr. John Smith, of Ozleworth, in Gloucestershire.]

**I**NSTEAD of planting potatoes at spring of the year, reverse the custom, and plant them against winter. Plant the roots in rows a pretty good depth, and draw the earth over them with a hoe, so as to keep them from the frost. At the spring of the year take down the ridges raised by the hoe, and when weeds appear, hoe the intermediate space between the rows, and when the plants appear draw up the earth round them. Many people put dung in the trenches when the potatoes are planted in the spring; if the same method be used against winter, it will help to preserve the roots from frost.

It is well known that bulbous-rooted flowers never blossom well if removed at the spring of the year. As potatoes are bulbous, the same inference may be drawn.

This year I have seen two patches, which were planted last year and again this season. In both  
these

these spots, the stalks that appeared from what were planted this year were curled and out of proof. The reason is, they do not set easy, nor are they so well acquainted with the ground when planted at spring as when planted against winter. I imagine the month of November is the best time for planting tulip-roots, and also potatoes.

What is called the blight in potatoes, the blight and smut in wheat, and the fly devouring the seedling turnips, are generally looked upon as a *cause*, yet I am clearly of opinion they are only *effects*.

I shall now add a few remarks on the best method to make a Cow a good Milker.

It is well known that the cow does not give her milk for the master, but for her calf. I would therefore advise, that for the first year the calf should go with the mother, till they both part by consent. Afterwards, when she calves a second, third, fourth time, and so on, let the calf be taken from the mother as soon as dropt, and never let them come together again.

In the usual method of letting the calf suck the cow for a time, and then taking it away, the  
cow

cow retains her milk in hopes of seeing her young one again; but in a few days her udder gets hard, and she cannot part with her milk freely, were she ever so willing. This is one great reason why we see so many cows with hard unsightly udders.

Nor is the loss confined to the first year only; for in some cows the hardness continues during life. Neither is the loss confined to the milk only; for when the cow is fat, it will not bring so much to the butcher by twenty or thirty shillings as if the udder were fine. This matter might in a few years be proved to any man's satisfaction.

Let any gentleman of fortune that likes to see good cattle on his farm, get good heifers and a good bull. At the usual time let them go together, and when the calves drop, never take them from the dam till they part by consent. Try this method for half a dozen times, and see if any of those heifers have hard nasty udders, as the butchers term them. If, when they calve, more milk should be left in their udders than the calves can take off, let that be taken away by the milker. In six weeks that trouble will cease, as the calf by that time will take all the milk any cow can give.

Query,

Query, Whether retaining the milk is not the reason why cows are more subject to the yellows than other cattle?

If at any time a good milch cow should go dry before her milk is gone, get a young calf and put it to her, in order to preserve her milk against another year: For it is well known, if a cow goes one year dry, nature will lose its power of acting for the future.

To prevent or keep meat from putrefaction till it is cold, whether ox, cow, sheep, or pig, let them be fasted a day or two in a cool house. Kill them in the evening, and as soon as the skin is taken off, hang the carcase between two doorways where there is a current of air. Then get a fan, such as is used for winnowing corn, and place it to windward of the carcase, and let a man turn the fan the whole night.

In the morning the carcase will be cold and stiff, let the weather be ever so hot. A putrefaction will not immediately follow, because the fluids are at rest. Carcase butchers, and people that kill for the navy, would find their account in having slaughter-houses near to some rivulet  
of

of water, where a wheel might be placed to turn a fan, and many carcases hung up at a time for the benefit of the wind. By this method, a considerable quantity of lost meat might be annually preserved; for in hot sultry weather, when no wind is stirring, meat will taint before it is cold.

Query, Whether this method might not be found useful in putrid fevers, if a fan were introduced into the sick person's chamber, and turned round now and then to clear the room of stagnant air, and thereby give the patient a better chance, by breathing more freely in a different atmosphere?

This thought occurred to me while I was in the farming business. A man whom I employed to turn the fan was troubled with fits. He fell down one day, and I ordered him to be set upon his bottom with his face to the wind, while another man turned the fan a few times round. The man, although to all appearance lifeless, soon began to rub his nose and mouth with his hand, and immediately came to himself.

J. S.

ARTICLE



## ARTICLE LIV.

*On the Use of Chalk and Sea Weeds.*

[By a Gentleman in Kent, to the Secretary.]

S I R,

**I**N answer to your enquiries about the use of chalk and sea-weeds, I will endeavour to inform you all in my power.

As to chalk, almost half this county is a bed of it. It is used with great success on various kinds of lands, as clays especially, and sands; lightening the former, and binding the latter. We commonly lay near one hundred cart loads on an acre; each cart-load containing thirty-two bushels, Winchester measure. We spread it soon after it is brought, and let it lie on the surface a good part of the winter, that the frost may make it run, and incorporate the better with the soil.

I have lately tried chalk on a piece of ground the merest sand that can well be, and found it to answer well by sowing early pease, and turnips the same year as soon as the pease were off, and feeding the turnips off with sheep. This I have  
done

done for three years together, and found each succeeding crop the best.

Sea weeds are much used on the eastern shore of this county. They are mixed with dung and mould, and after turning several times over spread on corn land.

I find you have offered premiums for several things in which I have been conversant; to wit, hops, madder, and wood for hop poles of various sorts. On each of which articles I can easily enlarge if required.

However, under the article of hop poles, I beg leave to mention a species of willow we have, the growth of which is very fit to be encouraged in places like Somersetshire; and which, in five years, will make very large poles proper for the purpose, as well as gates for sheep-folds on turnips.

I am, Sir, your humble servant,

H. D.

{ This gentleman's future correspondence will be very acceptable, with the information he here offers. }

ARTICLE

## ARTICLE LV.

*A Chart of the Norfolk Husbandry on a light  
a Farm of Twelve Fields*

	1778.	1779.	1780.	1781.	1782.	1783.
Fields.	Turnips.					
1.	5 Plough- ings.	Barley, 3.	Clover.	Wheat, 1.	Oats, 1.	Turnips, 5.
2.	Barley, 3.	Clover.	Beans, 1.	Wheat, 1.	Turnips, 5.	Barley, 3.
3.	Clover.	Pease.	Wheat, 1.	Turnips, 5.	Barley, 3.	Lay.
4.	Wheat, 1.	Oats, 1.	Turnips, 5.	Barley, 3.	Lay.	Lay.
5.	Oats, 1.	Turnips, 5.	Barley, 3.	Lay.	Lay.	Lay.
6.	Turnips, 5.	Barley, 3.	Lay.	Lay.	Lay.	Wheat, 1.
7.	Barley, 3.	Lay.	Lay.	Lay.	Beans, 1.	Wheat, 1.
8.	Lay.	Lay.	Lay.	Wheat, 1.	Oats, 1.	Turnips, 5.
9.	Lay.	Lay.	Wheat, 1.	Oats, 1.	Turnips, 5.	Barley, 3.
10.	Lay.	Pease. 1.	Wheat, 1.	Turnips, 5.	Barley, 3.	Clover.
11.	Wheat, 1.	Oats, 1.	Turnips, 5.	Barley, 3.	Clover.	Pease. 1.
12.	Oats, 1.	Turnips, 5.	Barley, 3.	Clover.	Wheat, 1.	Oats, 1.

*Soil ; being the best regular Course of Crops on Arable for Twelve Years.*

1784.	1785.	1786.	1787.	1788.	1789.
Barley, 3.	Lay.	Lay.	Lay.	Pease, 1.	Wheat, 1.
Lay.	Lay.	Lay.	Wheat, 1.	Oats, 1.	Turnips; 5.
Lay.	Lay.	Wheat, 1.	Beans, 1.	Turnips, 5.	Barley, 3.
Lay.	Wheat, 1.	Pease, 1.	Turnips, 5.	Barley, 3.	Clover.
Pease, 1.	Wheat, 1.	Turnips, 5.	Barley, 3.	Clover.	Wheat, 1.
Oats; 1.	Turnips, 5.	Barley, 3.	Clover.	Wheat, 1.	Oats; 1.
Turnips, 5.	Barley, 3.	Clover.	Wheat, 1.	Pease, 1.	Turnips, 5.
Barley, 3.	Clover.	Beans, 1.	Wheat, 1.	Turnips, 5.	Barley, 3.
Clover.	Beans, 1.	Wheat, 1.	Turnips, 5.	Barley, 3.	Lay.
Wheat, 1.	Oats, 1.	Turnips, 5.	Barley, 3.	Lay.	Lay.
Wheat, 1.	Turnips, 5.	Barley, 3.	Lay.	Lay.	Lay.
Turnips, 5.	Barley, 3.	Lay.	Lay.	Lay.	Wheat, 1.

*A Chart of the* NORFOLK HUSBANDRY  
*Course of Crops*

	1778.	1779.	1780.	1781.	1782.	1783.
Fields.						
1.	Turnips. *	Barley.	Clover. †	Wheat.	Oats.	Turnips. *
2.	Barley.	Clover.	Wheat.	Oats.	Turnips.	Barley.
3.	Clover.	Pease.	Oats.	Turnips.	Barley.	Lay.
4.	Wheat.	Oats.	Turnips.	Barley.	Lay.	Lay.
5.	Oats.	Turnips.	Barley.	Lay.	Lay.	Beans.
6.	Turnips.	Barley.	Lay.	Lay.	Beans.	Wheat.
7.	Barley.	Lay.	Lay.	Beans.	Wheat.	Turnips.
8.	Lay.	Lay.	Beans.	Wheat.	Turnips.	Barley.
9.	Lay.	Beans.	Wheat.	Turnips.	Barley.	Clover.
10.	Beans.	Wheat.	Turnips.	Barley.	Clover.	Wheat.
11.	Wheat.	Turnips.	Barley.	Clover.	Wheat.	Oats.
12.	Turnips.	Barley.	Clover.	Wheat.	Oats.	Turnips.

*on a heavy Soil; being the best regular  
for Eleven Years.*

1784.	1785.	1786.	1787.	1788.	1789.
Barley,	Lay.	Lay. †	Beans.	Wheat.	
Lay.	Lay.	Beans.	Wheat.	Turnips.	
Lay.	Beans.	Wheat.	Turnips.	Barley.	
Beans.	Wheat.	Turnips.	Barley.	Clover.	
Wheat.	Turnips.	Barley.	Clover.	Wheat.	
Turnips.	Barley.	Clover.	Wheat.	Oats.	
Barley.	Clover.	Wheat.	Oats.	Turnips.	
Clover.	Wheat.	Oats.	Turnips.	Barley.	
Wheat.	Oats.	Turnips.	Barley.	Lay.	
Oats.	Turnips.	Barley.	Lay.	Lay.	
Turnips.	Barley.	Lay.	Lay.	Beans.	
Barley.	Lay.	Lay.	Beans.	Wheat.	

## EXPLANATION of the preceding TABLES.

IN the first table the figures in the squares express the number of ploughings.

The two crops after the *lays* and *clover* may be varied according to the season, or the soil, by the discretion of the farmer. And where bullocks are fattened with straw and turnips only, this plan will be more productive of profit to the farmer, and benefit to society, than any other yet discovered; experience having shewn, that two hundred acres of land, half in tillage, and half natural grass, will keep as many cattle as the whole would do all in natural grass; by this means, therefore, all the produce of corn (labour deducted) is clear gain, and the land cannot be injured thereby.

It is to be noted, that the turnips are twice hoed, and not left nearer than fourteen or sixteen inches to each other;—that they must not be fed, but drawn, carted, and given to the bullocks in a straw yard, or some other place convenient for preserving the manure.

Beans must also be twice hoed, and in very wet seasons three times, if wheat is to follow them.

Pease



Pease are an uncertain crop, and often fill the land with weeds.

The two capital crops, wheat and barley, in these tables come twice in the course,—the turnips twice,—the broad clover only once; by which means the different plants are thrown at such a distance from each other, that (seasons permitting) it is impossible to fail of good crops; and the worm, which is produced by frequent repetitions of broad clover, and is certain destruction to that plant, and the succeeding crop, is prevented.

This mark \* signifies, that from twenty to forty cubic yards of rotten dung per acre is to be laid on immediately before the last ploughing.

This †—that a like quantity of compost, the mixture two parts ditch scourings, mould from borders, or almost any kind of earth, and the other part dung. This should be heaped, and in the course of two years turned over three times, to mix it well, and destroy the weeds. Lay it on the clover in the spring.

And this mark ‡ denotes a covering of marle, eighty cubic yards per acre. The lay is to be fed

the last year, so that it may be covered in the interval between hay and corn harvest.

Wheat, after the clover lay, ought always to be *set*.

Wheat stubbles are never ploughed in, but raked up, and carted to the straw yard.

The expence of marling (carting and spreading included) is reckoned, when the marle is digged in the field, at 3l. per hundred cubic yards, but I have done it for two guineas.

N. B. Six score makes the hundred. Half-load-carts, with three wheels, take fewer horses than load-carts, but are worse for the horses.

When the turnips fail, plough the land into yard ridges, water-furrow it well, and let it lay for barley next year. This is excellent husbandry, and greatly preferable to a wheat crop after the fallow.

The best method to preserve turnips from the fly is, to take one pint of new seed, and steep it in water five or six hours, then mix it with another  
pint

pint of new seed unsteeped, and a pint of seed of the year before; by this method the plants will come up at three different times; and as the fly always seizes the youngest plants, it seldom happens but that enough of each growth will be left for a crop: One pint of seed being sufficient for an acre, could it be properly distributed. In pursuing this method, I never lost a turnip crop.

Turnips, with chaff, and the straw of barley, oats, or pease, are excellent food for horses, provided the straw be fresh threshed, and given to them as they want it.

Galloway Scots, four years old, or almost any beasts of that age, taken into the straw yard in October, and well attended with good straw and turnips, will be fat by the April following. An acre of good turnips is sufficient for a beast of forty stone, fourteen pounds to the stone. The beasts here alluded to are such as are brought to the fairs in tolerable condition.

A GENTLEMAN FARMER,

Sibton Abbey, Oct. 18, 1778.

*To the Secretary of the Bath Society.*

S I R,

AS I was not at the meeting, I beg of you to lay what follows before the Committee. That no deception may arise from the foregoing tables, it is necessary to observe, that the course of crops contained in the first line of the table, was given me by the Rev. Mr. Howman, of Braccon in Norfolk, three years since. I formed them into a regular system for my own use, which I follow as closely as I can. But experience hath shewn, that it cannot be exactly pursued. Circumstances and seasons will not permit the invariable execution of the plan. Where lands are not good enough, and not infected with the worm, which kills the red clover, the farmer contents himself with the first five crops in the table, viz. Turnips, barley, clover, pease, wheat; or, instead of the two latter,

Wheat,		or	{	Beans,		or	{	Wheat,
Barley,			{	Wheat,			{	Oats.

This plan is therefore given to the Society, not as a course of husbandry, which has been invariably followed in Norfolk; but as the foundation on which the best husbandry there is built.

The

The failure of the turnip crop or the lays, the destruction of pease or beans by insects, or the irregularity of the weather, will, and indeed ought to occasion such variations as experience shall convince the intelligent farmer are most advantageous; but the nearer he keeps to the table, and when forced from it, the sooner he returns to it again, the better.

Mr. Howman, who is esteemed one of the best farmers in the county of Norfolk, has seen these Tables several times, and approved them.

A GENTLEMAN FARMER.

Dec. 10, 1778.

## ARTICLE LVI.

*An Essay on the Origin and Progress of Agriculture in different Ages and Nations.*

[By the Secretary to the Society.]

GENTLEMEN,

**A**S the advancement of Agriculture is at all times of the highest importance to the happiness and prosperity of the inhabitants of this kingdom, it has very properly become the object to which your views as a Society have been principally directed.

The earth was considered by the antients as the Mother of Plenty. Hence, in the early ages of superstition and polytheism, the first libations in their feasts were offered to her; and those who in any manner distinguished the arts of cultivation were numbered among their demi-gods, or second class of deities. They were rewarded with the highest honours while living; statues were erected to their memory, and sacrifices were offered to them, when dead.

But

But although a conduct so extravagant proved that the minds of the people were grossly enveloped in the mists of superstition, and an almost total ignorance of the nature and attributes of a supreme and first cause, yet it also forcibly indicated the high sense which mankind then formed of the great advantages arising from the arts of cultivation.

In ages of greater refinement, and more general knowledge, the folly of a worship thus grossly misapplied became so evident, as to occasion its final termination; but the wisest governments have always regarded Agriculture as an object of the first magnitude and importance, and by various means encouraged and promoted it.

With respect to ourselves, the value of our acres is the grand source of national riches; and this value will ever bear an exact proportion to their cultivation and produce. And therefore, as Agriculture is the basis of our public wealth, and the happiness of numberless individuals, I take the liberty of throwing before you a brief account of the origin and progress of this art in the different ages and nations.

The



The art of tilling, cultivating, and improving the earth, so as to render it fruitful, claims the precedence of all other arts in point of antiquity as well as dignity. It was man's original employment in the primæval ages of happiness and peace.

We are told by the sacred historian, that Adam instructed his children in this art both by precept and example; and that Cain applied himself to husbandry, whilst Abel led the life of a shepherd, feeding his flocks.

With respect to the methods then used, or the implements employed, we have no information; but when we consider the slow progress of the mechanic arts, it is reasonable to suppose, that at a time when the very rudiments of them could scarcely be known, those implements must have been very few, and of the simplest kind.

After the deluge had destroyed all the works of men, and swept away every vestige of human art (except the Ark) from the face of the earth, we find it was the first care of Noah and his descendants, to revive the knowledge and practice of husbandry; and to establish them as the first  
means

means of obtaining happiness and plenty in the various countries where they settled.

This art was carried on with the greatest simplicity in those early ages; and it would be a curious speculation to trace it through the slow and almost imperceptible gradations by which it has been brought to its present state of perfection.

With respect to manures, we have little account (except in the Bible) of any being used before the establishment of the Roman empire. In several of the Prophets\* we find mention is made of dung and dung-hills, in a manner which indicates that their use in fertilizing land was not wholly unknown.

It is probable, that the inhabitants of those ages which *immediately succeeded* the flood, knew not any method of restoring fertility to an exhausted soil; and this opinion seems warranted by their frequently changing their situation, when the land they occupied failed in yielding its natural produce.

\* See Kings vi. 25. ix. 37. Jer. viii. 2. Pf. lxxxiii. 10. Neh. iii. 13, 14. Ezra vi. 11. Isa. xxv. 10. Lam. iv. 5; &c.

We find that Abraham, and the rest of the Patriarchs, had no long-continued residence on one spot. They applied themselves to a pastoral life; and when their numerous flocks and herds had exhausted the natural produce of one place, they removed to another; ennobling by their example a profession or employment, which afterwards, for several ages, lost its original dignity, by being confined to the lower classes of the people.

Such was the happiness and tranquility enjoyed in this innocent employment, that it gave birth to the finest poetical imagery, and was celebrated under the peculiar distinction of the *Golden Age*.

But as soon as the descendants of Abraham were settled in Palestine, they generally became husbandmen, from the Chiefs of the tribe of Judah to the lowest branch of the family of Benjamin. High birth or rank did not at that time make any distinction, for Agriculture was considered as the most honourable of all employments; witness the illustrious examples of Gideon, Saul, and David.

Many passages in the Sacred Writings have a strong and beautiful analogy to the sentiments of the heathen poets, in delineating the happiness  
enjoyed

enjoyed in those ages of pastoral and agricultural employment.

The Chaldeans, who inhabited the country where agriculture had its birth, carried that valuable art to a degree of excellence unknown in former times. They cultivated their lands with great assiduity, and seem to have found out some means of restoring fertility to an exhausted soil, by having plentiful harvests in succession; on this account they were not obliged, as their predecessors had been, to change their situations, in order to obtain a sufficiency for themselves and their numerous flocks and herds of cattle.

The Egyptians, who, from the natural fertility of their country by the overflowing of the Nile, raised every year vast quantities of corn, were so sensible of the blessings resulting from agriculture that they ascribed the invention of that art to Osiris.

They also regarded Isis,\* their second deity, as the discoverer of the use of wheat and barley.

\* Isis discovered the method of making flour from wheat and barley.

which before grew wild in the fields, and were not applied by that people to the purposes of food.

Their superstitious gratitude was carried so far, as to worship those animals\* which were employed in tillage; and even to the produce of their lands, as leeks, onions, &c.

The divine honours paid to Bacchus in India were derived from the same source, he being considered in that country as the inventor of planting vineyards, and the other arts attendant upon agriculture.†

It is also related of the ancient Persians, on the most respectable authority, that their Kings laid aside their grandeur once every month to eat with husbandmen. This is a striking instance of the high estimation in which they held agriculture;

\* "Teach the dull ox why now he breaks the clod,  
"Why now a victim, and now Egypt's God."

POPE.

† According to Arrian and Diodorus Siculus, Bacchus first trained oxen to the plough, and taught men to cultivate the land. He also discovered many of the instruments and conveniences of agriculture; and for these signal benefits he became so much respected, that he was, by universal consent, raised to the rank of a deity, and received divine worship and solemn sacrifice,

for

for at that time arts were practised among that people in great perfection, particularly those of weaving, needle-work, and embroidery.

The precepts of the religion taught by their ancient Magi, or Priests, included the practice of agriculture. The *Saint* among them was obliged to work out his salvation by pursuing all the labours of Agriculture: And it was a maxim of the Zendavesta, that he who sows the ground with care and diligence, acquires a greater degree of religious merit, than he could have gained by the repetition of ten thousand prayers.

The Phenicians, so well known in scripture by the name of *Philistines*, were also remarkable for their attention to, and skill in Agriculture. But finding themselves too much disturbed and confined by the incursions and conquests of the Israelites, they spread themselves throughout the greatest part of the Mediterranean islands, and carried with them their knowledge in the arts of cultivation.

Mago, a famous general of the Carthaginians, is said to have written no less than twenty-eight books on the subject; which Columella tells us



were translated into Latin by the express order of the Roman Senate.

Servius confirms this account, and adds, that when Virgil composed his celebrated *Georgics*, he used these books as a model.

We are informed by the ancient writers, that Ceres was born in Sicily, where she first invented the arts of tillage and of sowing corn. For this essential service, she was, agreeable to the superstition of those ages, deified, and worshipped as the goddess of plenty.

The truth of this is, that in the time of Ceres, the island, through her endeavours and the industry of the people, became very fruitful in corn; and Agriculture was there esteemed so honourable an employment, that even their Kings did not disdain to practice it with their own hands.\*

But time, which at first gave birth to arts, often caused them to be forgotten when they were removed from the place of their origin. The descendants of Noah, who settled in Europe, doubtless carried their knowledge of Agriculture

\* Triptolemus, in particular, who was taught by Ceres the art of sowing corn.



with them into the regions which they successively occupied. But those who took possession of Greece were such an uncivilized race, that they fed on roots, herbs, and acorns, after the manner of beasts.

Pelasgus had taught them the culture of the oak, and the use of acorns as food, for which service we are told divine honours were paid him by the people.

The Athenians, who were the first people that acquired any tincture of politeness, taught the use of corn to the rest of the Greeks. They also instructed them how to cultivate the ground, and to prepare it for the reception of the seed. This art, we are told, was taught them by Triptolemus. The Greeks soon perceived that bread was more wholesome, and its taste more delicate, than that of acorns and the wild roots of the fields; accordingly they thanked the Gods for such an unexpected and beneficial present, and honoured their benefactor.

As the arts of cultivation increased, and the blessings they afforded became generally experienced, the people soon preferred them to whatever the ravages of conquest, and the cruel depredations

tions of savage life, could procure. And accordingly we find, that the Athenian Kings, thinking it more glorious to govern a small state wisely, than to aggrandize themselves, and enlarge the extent of their dominions by foreign conquests, withdrew their subjects from war, and mostly employed them in cultivating the earth. Thus, by continued application, they brought Agriculture to a considerable degree of perfection, and soon reduced it to an art.

Hesiod, who is generally thought to have been contemporary with Homer, was the first we know of among the Greeks who wrote on this interesting subject. According to the custom of the Oriental Authors, he wrote in poetry, and embellished his poem with luxuriant description and sublime imagery. He calls his poem "*Weeks and Days*," because Agriculture requires exact observations on times and seasons.

Xenophon has also, in his *Oeconomics*, remarked, that Agriculture is the nursing mother of the arts. For, says he, "where Agriculture succeeds prosperously, there the Arts thrive; but where the earth necessarily lies uncultivated, there the other arts are destroyed."

The

The other eminent Greek writers upon Agriculture were, Democritus of Abdera, Socraticus, Archytas, Tarentinus, Aristotle, and Theophrastus, from whom the art received considerable improvements; as it did also from Hieron, Epicharmus, Philometor, and Attalus.\*

The old Romans esteemed Agriculture so honourable an employment, that in the earliest times of the Republic, when patriotism was more than an empty name, the highest praise that could be given a man was to say of him, that he had well cultivated his spot of ground.

A judicious and learned writer† has of late very justly remarked, that “ One of the most immediate effects of an agricultural life is, that it imparts a settled disposition, and a great degree of local attachment. The very method also, of procuring subsistence from the earth, renders the spot which is the subject of cultivation familiar; and a kind of natural gratitude for the increase, tends to endear it to the mind.” And that “ it appears to have been a favourite piece of policy with the Romans, founded on

\* Agricult. Dictionary.

† Dr. Falconer, in his remarks on the influence of climate, situation, way of life, &c. on the tempers and manners of mankind. P. 353.

“ the best principles, to instil a notion of local  
 “ attachment as early as possible after the com-  
 “ mencement of the State.”

The most illustrious senators of the empire, in the intervals of public concerns, applied themselves to this profession ; and such was the simplicity of those ages, that they assumed no appearance of magnificence and splendor, or of Majesty, but when they appeared in public. At their return from the toils of war, the taking of cities, and the subduing of hostile nations, their greatest Generals were impatient till they were again employed in the arts of cultivation.† They thought it no disgrace to follow the plough, although they were at the same time prepared to serve the wants of the Republic in every department of the government, to attend her councils, or to put themselves at the head of her victorious legions.

It must indeed be allowed, that when the Romans became enervated by the fatal introduction of Asiatic luxury, they gradually lost the noble simplicity of their ancestors, and employed their slaves only in the severer labours of a country life.

† For instance, Regulus, Cincinnatus, and divers others.

But

But though they did not *themselves* hold the plough, yet even men of consular dignity looked upon it as a reward for their public services, when they obtained leave to retire into the country; and were equally respected when overlooking their farms, as when seated in the chair of magisterial authority.

Regulus, a celebrated Roman commander, when in Africa, requested of the Senate to be dismissed, lest his *farm* might suffer for want of proper cultivation in his absence; and the Senate wrote him for answer, that it should be taken care of at the public expence, while he continued to lead their armies.

The ancients appear to have entertained a uniform sense of the influence an agricultural life had on the manners and morals of the people. Alexander built cities for the Indian nations, that they might employ themselves in husbandry, and becoming thereby possessed of property, which naturally suggested a care for its preservation, they might on that account be more cautious of offering injury or violence to others.\*

\* History of India.

Cicero expresses an high opinion of the good effects of an agricultural life on the manners and conduct, in his work, *de Senectute & pro L. Roscio Amerino*.

And Strabo tells us, that those who practised Agriculture in India, were the most moral and just of any ranks of the people.

Cato the Censor, that illustrious Roman general, politician, and lawyer, after having governed extensive provinces, and subdued many warlike nations, did not think it below his dignity to write a Treatise on Agriculture. This work (as we are told by Servius) he dedicated to his own son; it being the first Latin treatise written on this important subject. This book has been handed down to us in all its purity, in the manner that Cato wrote it.

Varro composed a treatise on the same subject, and on a more regular plan. This work is embellished with all the Greek and Latin erudition of that learned author, who died twenty-eight years before the commencement of the Christian æra.

Virgil, who lived about the same time, has adorned



adorned this subject with the language of the Muses, and given it inexpressible grace, beauty, majesty, and dignity, by his verse. In his *Georgics*, he has finely embellished the precepts and rules of husbandry left by Hesiod, Varro, and Mago.

Columella, who flourished in the reign of the Emperor Claudius, wrote twelve books on husbandry, replete with important instruction. He was a native of Bœtica in Spain, and had devoted the principal part of his time to the study of Agriculture.

This art received likewise great improvement from the two Saffernaes, Scorfa, Tremellius, and Tarentius.

Palladius also wrote several treatises on the same subject.

From this period to that of the reign of Constantine Poganatus, husbandry continued in a declining state; but that wise Emperor caused a large collection of the most useful precepts relating to Agriculture to be extracted from the best writers, and published them under the title  
of



of Geoponics. It has been asserted, that he made this collection with his own hand; and the truth of the assertion is not improbable, as it is well known, that after he had conquered the Saracens, and the Arabians, he not only practised and encouraged, but studied the arts of peace, fixing his principal attention on Agriculture, as their best foundation.

But after the death of Constantine, the increasing attention of the people to commerce, and the ignorance and gross superstition of the ages which succeeded, seems to have rendered Agriculture an almost neglected science. We find no vestiges of any thing tolerably written on the subject. No new attempts were made to revive it, or to improve it, till the year 1478, when Crescenzio published an excellent performance on the subject at Florence. This roused the slumbering attention of his countrymen, several of whom soon followed his example. Among these, Tatti, Stefano Augustino Gallo, Sanfovino, Lauro, and Tarello, deserve particular notice.

But to return to our own country.—We are very much in the dark with respect to the state and progress of Agriculture in Great-Britain previous to the  
the

the fourteenth century. That it was pretty generally practised, especially in the eastern, south, and midland parts of England, is certain; but of the mode, and the success, we are left almost totally ignorant. In the latter end of the fifteenth century, however, it seems to have been cultivated as a science, and received very great improvement.

At this time our countryman, Fitzherbert, Judge of the Common-Pleas, shone forth with distinguished eminence in the practical parts of husbandry. He appears to have been the first Englishman who studied the nature of soils, and the laws of vegetation, with philosophical attention. On these he formed a theory confirmed by experiments, and rendered the study pleasing as well as profitable, by realizing the principles of the ancients, to the honour and advantage of his country. Accordingly, he published two treatises on this subject; the first, intitled "*The Book of Husbandry*," appeared 1534; and the second, called "*The Book of Surveying and Improvements*," in 1539.

These books, being written at a time when philosophy and science were but just emerging  
from

from that gloom in which they had long been buried, were doubtless replete with many errors; but they contained the rudiments of true knowledge, and revived the study and love of an art, the advantages of which were obvious to men of the least reflection. We therefore find that Fitzherbert's books on Agriculture soon raised a spirit of emulation in his countrymen, and many treatises of the same kind successively appeared, which time has however deprived us of, or at least they are become so very scarce as only to be found in the libraries of the curious.

About the year 1600, France made some considerable efforts to revive the arts of husbandry, as appears from several large works, particularly, *Les Moyens de devenir Riche*; and the *Cosmopolite*, by Bernard de Palissy, a poor porter, who seems to have been placed by fortune in a station for which nature never intended him; *Le Theatre d'Agriculture*, by Deserres; and *L'Agriculture et Maison Rustique*, by Messrs. Etienne, Liebault, &c.

Nearly in the same period, the *practice* of husbandry became more prevalent among this people and the Flemings than the publishing of *books* on the subject. Their intention seemed to be that  
of

of carrying on a private lucrative employment, without instructing their neighbours. Whoever therefore became desirous of copying their method of Agriculture, was obliged to visit that country, and make his own remarks on their practice.

The principal idea they had of husbandry was, by keeping the lands clean and in fine tilth, to make a farm resemble a garden as nearly as possible.

Such an excellent printiple, at first setting out, led them of course to undertake the culture of *small farms* only, which they kept free from weeds, continually turning the ground, and manuring it plentifully and judiciously. When they had by this method brought the soil to a proper degree of cleanliness, health, and sweetness, they chiefly cultivated the more delicate grasses, as the surest means of obtaining a certain profit upon a small estate, without the expence of keeping many draught horses and servants. A few years experience was sufficient to convince them, that ten acres of the best vegetables for feeding cattle, properly cultivated, would maintain a larger stock of grazing animals, than forty acres of common farm grafs on land badly cultivated. They also found,  
that

that the best vegetables for this purpose were lucerne, faintfoin, trefoil of most kinds, sweet fenugreek, buck and cow wheat, field turnips, and spurrey.\*

The grand political secret of their husbandry, therefore, consisted in letting farms on improvement. They are said also to have discovered nine sorts of manure, but what they *all* were, we are not particularly informed. We find however, that marle was one of them, the use and virtues of which appear also to have been well known in this kingdom two hundred years ago,† although it was afterwards much neglected. They were the first people among the moderns, who ploughed in green crops for the sake of fertilizing the soil; and who confined their sheep at night in large sheds built on purpose, the floors of which were covered with sand or virgin earth, &c. which the shepherd carted away each morning to the compost dunghill.

Let us now return to England. During the reign of Charles the first, our fatal domestic dissensions and wars reversed the true order of things, changing our ploughs and pruning hooks into martial weapons. But in the general revolution

\* Agricult. Dictionary.

† See Fitzherbert and Tuffer.

of affairs, which took place on the death of that unfortunate Monarch, artful and avaricious men crept into the confiscated estates of such of the nobility and gentry as had steadily adhered to the royal cause; and as many of these *new* incroachers *had risen* from the plough, they returned with pleasure to their old occupations, being chiefly animated with the love of gain. About this time, Tusser, Platt, Plattes, Hartlib, Blythe, and some others, seized this favourable opportunity of encouraging the disposition of the common people, by writings, which have been equalled by few in later times.

This revival of the art of husbandry received considerable encouragement from Cromwell himself.

Sir Hugh Platt was one of the most ingenious husbandmen of the age in which he lived; yet so great was his modesty, that all his works, except his *Paradise of Flora*, seem to be posthumous. He held a correspondence with most of the lovers and patrons of Agriculture and Gardening in England; and such was the justice and modesty of his temper, that he always named the author of every discovery communicated to him. Perhaps



haps no man in any age discovered, or at least brought into use, so many new kinds of manure. This will be evident to those who read his account of the compost and covered dung-hills, and his judicious observations on the fertilizing qualities lodged in salt, street-dirt, and the *sullage* of streets in great cities, clay, fuller's-earth, moorish earths, dung-hills made in layers, fern, hair, calcination of all vegetables, malt-dust, willow tree earth, soaper's ashes, urine, marle, and broken pilchards.

Gabriel Plattes may be said to have been an original genius in husbandry. He began his observations at an earlier period, in the reign of Queen Elizabeth, and continued them down to the Commonwealth. But notwithstanding the great merit of this writer, and the essential service he had rendered his country by his writings, the public ungratefully suffered him to starve and perish in the streets of London; nor had he a shirt on his back when he died.

Samuel Hartlib, a celebrated writer on Agriculture in the last century, was highly esteemed and beloved by Milton, and other great men of his



his time. In the preface to the work entitled *his Legacy*,\* he laments that no public director of husbandry was established in England by authority; and that we had not adopted the Flemish method of letting farms upon improvement.

This remark of Hartlib's procured him a pension of 100l. a year from Cromwell; and the writer afterwards, the better to fulfil the intention of his benefactor, procured Dr. Beatti's excellent annotation on the *Legacy*, with other valuable papers from his numerous correspondents.

The time in which Hartlib flourished seems to have been an æra when the English husbandry rose to great perfection, compared with that of former ages; for the preceding wars had impoverished the country gentlemen, and of course made them industrious. They found the cultivation of their own lands to be the most profitable station they

\* It must be here observed, that the famous work attributed to Hartlib, and called *his Legacy*, was not written by him. It was only drawn up at his request by one R. Childs, and after undergoing Hartlib's correction and revision, was published by him. It consists of a general answer to this question; "What are the actual defects and omissions, and what the possible improvements, in English husbandry?"

could fill: But this wise turn was not of long continuance. At the Restoration, they generally became infected with that intoxication and love of pleasure which succeeded. All their industry and knowledge were exchanged for neglect and dissipation; and husbandry descended almost entirely into the hands of common farmers.

In that age of unrestrained indulgence, when vice and folly were pursued to the exclusion of almost every thing serious and truly interesting; Evelyn was the first writer who inspired his countrymen with a desire of reviving the study of Agriculture: He was followed by the famous Jethro Tull. And their joint labours opened a new and extensive sphere for the minds of mankind to range in.

Evelyn, by his admirable Treatises on earth and on planting, and Tull, by shewing the superior advantages of the drill-husbandry, excited numbers to bring their theory to the test of fair experiment; and the success that attended it, proved the rectitude of their general principles, and the solidity of their reasoning.

Many valuable and capital improvements have, since that period, been made in English husbandry:

And

And these great men have been succeeded by a variety of writers, many of whom have done essential service, by enlightening the minds of their countrymen, and exciting them to emulation.

About the middle of the last century, Ireland began to make a considerable figure in the art of husbandry. It must, indeed, be confessed, that the Irish had very strong prejudices in favour of a wretched method of Agriculture, till Blythe opened their eyes by his excellent writings. Since that time, a spirit of improvement has more or less been promoted, and in many instances carried on with great zeal, by the nobility, clergy, and gentry, of that kingdom.

In proof of this, it will be sufficient to observe, that the transactions of the Dublin Society for encouraging husbandry are now cited by all foreigners, in their Memoirs relating to that subject. And the observations of that discerning and judicious writer, Arthur Young, esq; in his late Tour through that kingdom, shew, that in many respects improvements there have of late years made a progress nearly as rapid as in England.

After the peace of Aix-la-Chapelle, most of the nations of Europe, by a sort of tacit consent,

applied themselves to the study of Agriculture, and continued to do so, more or less, amidst the universal confusion that succeeded.

The French found by repeated experience, that they could never maintain a long war, or procure a tolerable peace, unless they could raise corn enough to support themselves in such a manner as not to be obliged to harsh terms on the one hand, or to perish by famine on the other. This occasioned the King to give public encouragement to Agriculture, and even to be present at the making of several experiments. The great, and the rich of various ranks and stations, followed his example; and even the ladies were candidates for a share of fame in this public-spirited and commendable undertaking.

During the hurry and distresses of France in the war of 1756, considerable attention was paid to Agriculture. They felt the effects, and saw the necessity of promoting it. Prize questions were annually proposed in their rural academies, particularly those of Lyons and Bourdeaux; and many judicious alterations were made by the Society for improving Agriculture in Brittany.

Since the conclusion of that war in 1760, matters have been carried on there with great vigour.

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The University of Amiens made various proposals for the advancement of Husbandry; and the Marquis de Tourbilly (a writer who proceeded chiefly on experience) had the principal direction of a Geographical Society established at Tours.

The Society at Rouen, also, deserves notice; nor have the King and his Ministers thought it unworthy their attention. There are at present about fifteen Societies existing in France, established by Royal approbation, for the promoting of Agriculture; and these have twenty co-operating Societies belonging to them.

About this time vigorous exertions began to be made in Russia to introduce the most approved system of Husbandry which had taken place in other parts of Europe. The present illustrious Empress of that vast and rising empire has sent several Gentlemen\* into England and other nations, to study Agriculture, and is giving it all possible encouragement in her own dominions.

The Art of Agriculture has also been for near thirty years publicly taught in the Swedish, Da-

\* M. John Komove, of Petersburg, one of these Gentlemen, is an honorary Member of the Bath Society.

nish, and German Universities, where the Professors may render effectual service to their respective countries, if they understand the practical, as well as the speculative part, and can converse with as much advantage with the Farmer as with Virgil and Columella.

Even Italy (sunk as it is in luxury and the enervating arts of pleasure) has not been totally inactive. The Neapolitans of this age have condescended to recur to the first rudiments of revived husbandry, and begun to study anew the Agricultural System of Crescenzo, first published in 1478.

The people of Bergamo have pursued the same plan, and given a new edition of the *Ricordo d' Agricolturæ de Tarello*, first published in 1577.

The Dutchy of Tuscany have to their honour imbibed the same spirit for improvement. A private Gentleman, above forty years since, left his whole fortune to endow an Academy of Agriculture. The first Ecclesiastic in the Dutchy is president of this society, and many of the chief nobility are members.

Animated with a desire that the people under his government should excel in the art of husbandry,



dry, his Sardinian Majesty has also sent persons to learn the different modes of practice in foreign countries; and made some spirited attempts to establish a better method of Agriculture among his subjects.

In Poland, where a natural fertility of soil seems to dispense with the necessity of calling in the aid of improvements, M. De Bieluski, Grand Marshal of the Crown, has made many successful attempts to introduce the new husbandry among his countrymen; and procured the best instruments for that purpose from France, England, and other parts of Europe.

The Hollanders are the only people now in Europe who seem to look upon Agriculture with indifference. Except the single collateral instance of draining their fens and morasses, they have scarcely paid any attention to it; and even this seems to have proceeded more from the motive of self-preservation than any love of, or disposition to husbandry.

In the year 1759, a few ingenious and public-spirited men at Berne in Switzerland established a Society for the advancement of Agriculture and  
rural



rural œconomics. In that society were many men of great weight in the republic, and most of them persons of a true cast for making improvements in husbandry, being enabled to join the practice with the theory.

Nor must we here omit to mention, that the justly celebrated Linnæus and his disciples have performed great things in the North of Europe, particularly in discovering new kinds of profitable and well-tasted food for cattle.

About the same time, Sweden largely augmented a commerce that had long been confined within narrow bounds; and with a spirit worthy of general imitation, bestowed successful labours on a soil which had before been looked upon as cold, barren, and incapable of melioration. Of this the Stockholm Memoirs will be a lasting Monument.

Denmark, and many of the courts in Germany, followed the same example: Woollen manufactures were encouraged, and his Danish Majesty sent three persons into Arabia Felix to make remarks, and bring over such plants and trees as would be useful in husbandry, building, and rural affairs.

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The Dutchy of Wirtemburgh also, a country by no means unfertile, but even friendly to corn and pasturage, has contributed its assistance towards the improvement of Agriculture, having more than thirty years since published fourteen œconomical relations at Stutgard.

Nor must we forget the very assiduous attention of the learned in Liepsie and Hanover to this great art of supporting and rendering mankind happy, wealthy, and powerful. During the rage and devastation of a long war they cultivated the arts of peace; witness the *Journal d' Agriculture* printed at Liepsie, and the *Recueils d' Hanover* printed in that city.

Even Spain, constitutionally and habitually inactive on such occasions, in spite of all their natural indolence, and the prejudices of bigotry, invited Linnæus, with the offer of a large pension, to superintend a college founded for the purpose of making new enquiries into the History of Nature, and the Art of Agriculture.

But, without any improper partiality to our own country, we are fully justified in asserting, that England alone exceeds all modern nations in  
Husbandry.

Husbandry.\* To the natural genius of the people have been added the theory and practice of all nations in ancient and modern times. This accumulated mass of knowledge has been arranged, divided, and subdivided; and after passing the test of practical experiments, the essential and most valuable parts of it have been preserved and amply diffused in the works of a few excellent writers on the subject. And from the spirit which for the last twenty years has animated many of our Nobility and gentry, to become the Liberal Patrons of improvement, there is reason to hope that this most useful of arts will, in a few years, be carried to a greater pitch of perfection than it has ever yet attained in any age or country.

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\* Mr. Young, in comparing the Linen Manufacture in Ireland with the manufactures of this kingdom, makes the following observations:—"The manufacture of the single city of Norwich (says he) amounts to near as much as the whole linen export of Ireland, yet very far is that from being the whole exported produce of a province! It is not that of a single county; for Norfolk, besides feeding that city, Yarmouth and Lynn, two of the greatest ports in England, and a variety of other towns, exports, I believe, more corn than any other county in the kingdom; and whoever is acquainted with the supply of the London markets knows, that there are thousands of black cattle fattened every year on Norfolk turnips, and sent to Smithfield. What a spectacle is this! The agriculture in the world the most productive of wealth by exportation, around one of the greatest manufactures in Europe."

Tour through Ireland, part 2, p. 112.

The very respectable Societies which have been established on the most liberal plans, in London, Norfolk, and divers other parts of this nation, have made spirited exertions for the advancement of Agriculture. They have already done much, and there is reason to expect, that the opportunity and assistance which the restoration of peace affords, will enable them to do much more of what remains to be accomplished.

And here it is not easy to resist the impulse I feel of expressing a wish that the several Provincial Societies in this kingdom were, like those of some *other* countries, distinguished and encouraged by a *portion of Royal munificence*.\* This would reflect additional lustre even on Majesty, and animate individuals liberally to support these institutions, which reflect the highest honour on a state, and tend to promote the interest and happiness of every class of its inhabitants.

\* The Society particularly recommend *this hint* to such of their Readers as are Members of the Legislature; as some public encouragement of this kind to *Provincial Societies* would be consistent with the wisest policy, and is greatly to be wished by every lover of his country. This, if once obtained, would influence numbers to join such Societies, and thereby render their finances equal to more liberal exertions for the accomplishment of a system of general improvement in Agriculture.

But

But it is not to the exertions of public societies, excellent and honourable as they are, that *all* our modern improvements in Agriculture owe their origin. A considerable number of valuable books have within the last thirty years been published on the subject; in consequence of which the knowledge of improvements made in this and other nations have been amply spread, which might otherwise have remained confined to a single county, or even a still smaller district. Among these, the works of Lord Kaimes, Mr. Young, Stillingfleet, Dr. Hunter, Ellis, Randal, Lisle, Clarke, Marshal, Mortimer, Varley, Baker, Harte, Duhamel, Bradley, De Turbilly, Kent, Mills, and others, have greatly tended to enlighten the understandings of such as read them, and to remove the deeply-rooted prejudices in favour of ancient modes of practice which farmers in general are too apt to entertain.\* In mentioning these, your own Publication of Select Papers must not be forgotten;—a publication which, if continued on the same judicious plan with what has already appeared, will tend in an eminent degree to accomplish that purpose which gave existence to your disinterested and laudable institution.

\* The Museum Rusticum, the Farmer's Dictionary, and the Farmer's Magazine, may not perhaps be improperly mentioned;—each containing detached pieces of acknowledged merit.

Every

Every individual who wishes the prosperity and happiness of this country, reveres your spirited exertions to promote these valuable purposes. And I flatter myself the intelligent and liberal-minded, who are not at present its patrons, will be induced, from the same motives of public spirit, to give it the sanction of their approbation, not only in praises which cost nothing, but in contributing to its support and enlargement.

I am conscious that the imperfect sketch here given of the progress, successive improvements, and present state of Agriculture, is by no means so worthy of your attention as I could wish, or as it ought to have been. But as it may possibly excite some abler pen to resume the subject, I submit it entirely to your disposal; and have the honour to subscribe myself,

Gentlemen,

Your's most respectfully,

EDMUND RACK.

Bath, May 20, 1783.

ARTICLE

## ARTICLE LVII.

*On Planting barren Lands with Wood.*

[By a Correspondent Member.]

GENTLEMEN,

**A**MONG all the improvements which a lover of his country would naturally wish to see take place, there are none which seems to want, or to merit encouragement, more than that of planting barren soils and waste lands with wood. One principal cause of this improvement having made a slower progress than many others is, that the first expence is considerable, and the profits, although certain in the end, are remote; and therefore I have for several years wished to see your premiums increased on this article.

As I have made considerable plantations in my time, and always found the future profits, as well as the present pleasure attending it, to exceed my expectations, I do not offer my advice on an uncertain theory, but *know* what I take the liberty of recommending to you.

There are three kinds of land usually termed barren; and with respect to almost every purpose  
but



but that of planting, they are, and must remain so, unless an expence, greater than most people chuse to be at, be submitted to in improving them.

The first kind is mere sand. This soil, unless there is clay or marle at a few feet depth under it, (as is the case in the West part of Norfolk, about Thetford and Brandon) will pay better by being planted with Scotch Firs and Larches than any thing else; especially, if in making the plantations, a little clay or marle be mixed with the sand in the holes where each tree is planted; and this may be done at a small expence.

These trees will grow here very well. I know several large plantations, where the soil has been so perfectly sandy, that there was not grass enough to keep one sheep on an acre, and yet after being planted twenty years, there have been two thousand trees on an acre, worth at the lowest estimate one shilling each as they stood. A few acres of such land thus planted would be a pretty fortune for the younger branch of a family.

The second kind is boggy or wet moors, which are sometimes so situated as not to be drained without too great an expence. Wherever this is  
the

the case, such soils may be planted to great advantage, as Mr. Fletcher in his letter on this subject, printed in your first volume, has justly remark'd. Ash for poles or coping, will thrive here beyond expectation; and alders, with several species of the fallow tribe, will grow rapidly, and in twenty years after planting pay a profit of three pounds per acre per annum, for the whole time. The expence attending it is confined almost wholly to the first five or six years; for after that time little more is required than to keep up the fences, and the profit is certain.

The third soil on which planting answers better than any thing else, is barren rocky hills, which cannot be ploughed on account of the stones lying level with the surface, or growing above it. In such places there are numerous little clefts or fissures in the rocks, filled with veins of earth to a considerable depth, which the roots of trees will follow and find sufficient nourishment in. Many instances of this may be found in the counties of Somerset, Gloucester, and Dorset, where the wisdom of our forefathers induced them to try the experiment. On the North slope of Mendip hills in particular, (a situation as unfavourable as most, on account of its being a bed of rocks exposed to  
the

the bleak North and East winds) we see beautiful woods of large extent hanging over the parishes of Compton-Martin, Ubley, Blagdon, Hutton, and Churchill. In these woods, although the timber is not large, the growth of the pollard trees and copse wood must every twelve years bring in considerable sums to the owners, although the land for any other purpose would not be worth one shilling an acre.

In planting barren mountainous situations, full of stone, no particular directions can be given as to the number of trees per acre, for you must follow the veins of earth where they are deepest; but in general plant as thick as you can, for this will best prevent the bad effects of tempestuous winds, by the interior parts being sheltered from them.

In these situations intermix Scotch Firs, which will secure less hardy trees from the fury of the winds, especially if a double row of them form the boundary. As the surfaces of such places are mostly craggy and uneven, be careful to plant your trees in the little hollows, for two reasons; *first*, because there is most earth and moisture; and *secondly*, because in these cavities the plants

will, while young, be most sheltered from the winds. Fear not to plant too thick, for as the plants increase in size and hardness, you may thin them at pleasure, and the wood will pay for the labour.

Your young plants should be raised in a situation as similar as possible to that where you intend they should continue; for if they are transplanted out of a rich warm nursery, it would prove their destruction. As there is seldom sufficient depth of soil among the rocks to receive long tap-roots, the plants which naturally have them should be cut off when they are first taken from the seed-beds and planted in the nursery. By treating them in this manner, although their vigour will be checked for the first year or two, until they have sent forth a number of lateral roots, they will recover their strength, and prove equally thrifty with others.

These plantations may be made with beech, birch, oak, ash, sycamore, and black poplar; always observing to place the tenderest trees in the least exposed situations, where they are sheltered from North and East winds. In places where the soil is very thin, raise little hillocks  
about

about the young plants, which will greatly encourage their growth.

In such bleak situations, plant as late in the spring as you can with safety. April is a month in which it may be expected the most stormy weather is over, and all the kinds of trees I have mentioned may safely be replanted at that time. But your nursery should always be near the spot you intend to plant, or else the roots of your young trees will get dry, and their buds be rubbed off in carriage.

During the first three months after planting, they should frequently be examined, and the earth made fast about their roots, otherwise they will be loosened by the winds; but after that time they will have put forth new roots sufficient to hold them securely.

The upright English elm, and the wick elm, may also be properly introduced in these situations, for they are hardy trees, and, when once rooted, grow well on rocky soils. The timber of the latter is very valuable for naves of carriage wheels, and boring for water-pipes.

If oaks, chefnuts, or beech, or indeed any other tree that sheds its leaves in winter, grow crooked, make incisions with the point of a knife from top to bottom in the hollow part. This will occasion the tree to increase in bulk more in those parts than in any other; and by this simple easy method, I have known many a crooked tree grow strait and handsome.

I shall be happy if these few observations may in any degree prove useful, or tend to encourage planting in your counties.

I am, your's, &c.

Somerfet.

R. E.

#### ARTICLE LVIII.

*Description of the Model of a Norfolk Plough,  
sent to the Society by Mr. Boswell.*

[Illustrated with an accurate Engraving.]

S I R,

Piddletown, Dec. 4, 1779.

**T**HE model of the Norfolk Plough, which I now send agreeable to the request of the Society, is complete on a scale of three inches to a foot.

a foot. As an explanation of its various parts may be necessary, I flatter myself the following observations will not be deemed impertinent.

#### EXPLANATION.

A the tail. B the beam. C the head.

D the wood spindle. E the iron spindle.

F the wood mould-board fitted to the iron plat, or turn furrow.

G the iron turn furrow: This part is generally cast to its proper shape.

H the share, with a socket to fit on the head, by which means it is easily taken off to be repaired.

I the side iron. K the heel iron. L the ground raise. These three are often made of cast-iron.

M a pin to keep the mould-board at a proper distance.

N the coulter.

O O O O O O O O eight iron pieces to strengthen the joints, and those parts where the greatest power or friction is applied. P a staple in the tail, through which the plough-line passes. Q the beam-ring and breast-iron.

R the breast. S the pillar. T the standards.

V W pillar-pins and chains. U U standard-pins and chains. W beam-pins and chain. X the beam-ring and breast-iron pin and chain. Y the gate. Z the heart and links.

A B the beam nail. A C, A C, two holes in the standard-head through which the plough-line passes.

S the horse-tree, or bodkin, fixed by the clasp (2) to the heart (Z) on the gate Y. 3 3 two clasps on each end of the horse-tree (S) to which the hamble-trees, or weas,

A a 3

(4 4) are



(4 4) are fixed, on each of which are two clasps (5 5 5 5) to receive the horses traces.

#### OBSERVATIONS.

*First*; The holes in the standard (TT) are to raise or lower the pillar S by means of the standard-pins (UU) which is one way of setting the plough deeper or shallower in the land; but when once fitted to a proper size, it is seldom altered by this part, unless very deep water-furrows are to be drawn, or the share is much worn. — For the same use are the different holes in the breast-iron Q.

*2dly*; The holes in the pillar S, are for the pillar-pins V V, to alter the direction of the beam of the plough, either to the furrow or land, according as the furrows want to be thrown either flat or round. The same use is made of the notches in the gate Y.

*3dly*; The holes in the beam (B) by which the beam-ring and breast-iron (Q) are fixed to the beam by the beam-nail (A B) and also by the beam-pin and chain, (W) which is fixed to the top of the standards in the centre, these unite the plough and breast-work together. By these holes the plough is regulated, and so nice are the ploughmen in Norfolk in ploughing to a proper depth where there are little inequalities in the land, and upon such just mechanical principles is it constructed, that a quarter of an inch alteration in the beam-nail and beam-pin will be perceived in the going of the plough either deeper or shallower. This will scarcely be credited, but I assert it upon my own knowledge.

knowledge. The breast-pin drawn up half its length, and the beam-nail turned upon its opposite quarter, frequently in ploughing a fallow, is enough to sink the plough perceptibly. By these means, one of these ploughs will plough almost to any depth, or barely skim the surface.

*4thly*; The coultter N, when set properly, the point should be about three inches from the share, and in such a direction, that a line strained from the hinder part of the side-iron to the point of the coultter, should just free the side of the share. This is the rule the ploughmen set it by.

*5thly*; The plough-line passes from the outside ring of the bit of the halter of the one horse, through a ring in the beams, and through the hole A C in the standard, and through the staple P in the tail of the plough, and up again through the other hole A C, through a ring in the beam to the ring in the bit of the outside of the halter on the other horse. A coupling-line is fixed from the inside ring of the halter of one horse to the inside ring of the other horse's halter; by this means the ploughman, pulling the line on either side of the tail of the plough, readily guides the horses which way he pleases.

*6thly*; The horses' traces should be so short as barely to clear their hocks when in their work; in fact, the horses should be brought back as near as possible to the point of draught.

*7thly*; The plough when well constructed should, when standing in its work, rest only upon the hind part of the head

head (C) and the edge of the share H; in other words, it should have the least possible friction.

*8thly*; Complex as this plough may appear to be, the various methods of altering it are so simple, that every common ploughman knows how to do it readily.

*9thly*; The superior advantages of the Norfolk plough over every other sort that I have seen (except those constructed on the same principles, though varied in their form) are many. A few I will mention, that gentlemen may be better able to judge of its superior utility.

*First*; It goes with only two horses without a plough-boy. This, probably, will be matter of surprize, but I aver it, that two good able horses with one of these ploughs will break up the strongest (level) land I ever saw in Somersetshire, and at a proper season will plough nearly an acre in a day. I have myself been witness to land being broken up whose surface would make bricks, and so hard that near an hundred weight has been put in the chamber of the plough, (the opening between the mould-board and beam) and yet only two horses have been used, and more than half an acre was ploughed in a day.

Another advantage is, having but one handle, which the man holds in his left hand; he carries his whip in the other, and when necessary takes the plough-line in it, and directs his horses to right or left as he chooses,

A third advantage is, having but one handle, he, by stopping his horses, and stepping one step forwards, can,  
in

in *half a minute*, take up or let down (raise or sink) his plough in any direction he finds necessary. This a good ploughman will do in land that is very uneven, two or three times in a furrow.

A fourth advantage is, having but two horses, and those going a-breast, he can always see between them, and by that means draws out his work as strait as a line can be stretched, and makes his furrows as true and exact as it is possible to be conceived.

Many other advantages could be pointed out, but I have already trespassed on your patience; and to draw comparisons with the plough commonly used in the West of England, might to many gentlemen appear invidious. But lest I lead any into error, permit me to add, that the Norfolk plough is not calculated for stony or very hilly land; nor will it break pasture land properly to sow on one earth.

Your most obedient humble servant,

Mr. Rack.

GEORGE BOSWELL.

#### ARTICLE LIX.

#### *An account of the Success of a late planted Crop of Potatoes.*

GENTLEMEN,

**I**N the month of June 1782, a gentleman near Bath planted three acres and half of land with potatoes of the long kidney-shaped white kind from

from Ireland. The soil was a lightish loam, and being virgin earth, no manure of any kind was used. The ground was dug about eight or nine inches deep, and the seed potatoes cut into sets, and planted about a foot or fourteen inches apart, in holes made with dibbles. Notwithstanding the late time of planting, they grew very well, and produced, when taken up in October, three hundred and eighty sacks of four bushels each sack, or nearly four hundred and forty bushels per acre. None of them were very small, and few very large; but mostly of a good full middling size, fit either for the table or planting. Not a plant in this crop was curled, or infected with any disease.

I am, &c.

Bath, May 1, 1783.

T. B.

[N. B. Favourable as the above crop may appear to the late planting of potatoes, we wish not to recommend that practice. In the present instance, we are inclined to believe, the uncommon wetness of the season was the principal cause of the crop being so large. Had the summer proved dry, we think this gentleman's experiment would have proved a losing one; as the plants would naturally have been so slow of growth, as for the autumn frosts to check them before they could arrive at full maturity. We consider the beginning of May the best season for planting potatoes on a large scale; they have then a chance of every advantage which the variety of the season affords, without being in any danger of suffering from early growth by late spring frosts, which (as has been the case this season) often cut off those planted in the beginning of April.]

## ARTICLE LX.

*On crossing the Breed in Sheep and Neat Beasts.*

S I R,

March 8, 1781.

ON reading the advertisement of the Bath Agriculture Society, I was induced to take the liberty of addressing to you this letter.

I have rams to let for the season from five to twenty guineas. They were bred from some of the best stock of that famous breeder Mr. Bakewell, of Dishley in Leicestershire, a sort esteemed the best in England, and which Mr. Young, in his Eastern Tour, gives a particular account of. They are of the polled kind, and the peculiar benefits arising from them are, their hardiness, and extra quantity of wool. The first proceeds no doubt from their perfect form, as we have tried them with common sheep of most counties, and always found they have done considerably better though kept exactly alike. *Secondly*, they come to a very great weight. And *lastly*, instead of cutting three or four pounds of wool, which is more than is generally done, I always cut from six to fourteen pounds off each sheep. And as  
 you

you must have in your neighbourhood the best judges in this commodity, from the number of hands employed in its manufacture, I have taken the liberty to inclose you a lock of it for inspection, and believe they will find it a very good staple.

The wool in paper No. 1, is from a ram shorn twice last year. That in No. 2, is from a tegg or lamb of last year.

A cross breed from the rams and the common Hampshire ewes, have been found remarkably profitable, having been sold lean at two years old for twenty-five shillings each, and many have been killed at thirty pounds a quarter, which is remarkable for this poor backward county, and not nearly equalled by any of our neighbours.

The late Lord Northington, about twenty-five years ago, had a ram of this kind from Mr. Bakewell's father, and the cross breed from him sold at great prices to the Dorsetshire farmers; who found it answer so well, that the ram lambs from his Lordship's farm bore the belle for many years.

Our



Our bulls (bred also from Mr. Bakewell's stock) are from five to twenty guineas the season. Their merit is in being hardier than even Welsh or Scotch cattle, and remarkably well-shaped and small-boned, at the same time capable of being brought to a greater degree of fatness than any other breed whatever.

I have no doubt myself but a breed from a bull of this sort, and the cattle of Somerset or Devon, would prove essentially useful, and for the following among other reasons:—

Your oxen require the best pastures, and that for a long while; and then, from their make, (being set high on their legs) they weigh very light when they come to the scale. These are their faults; yet they cut with the finest grain of any beasts in England, and fetch more pound for pound than any brought to Smithfield market.

Our beasts are remarkably short-legged, very broad over their backs, and very quick feeders. I assure you that three of them will fatten in the same time that two of your's will. I therefore conceive the cross breed will be very useful in those points that the cattle of Somerset and Devon fail in.

My

My farm is on a very poor chalky soil, and is always open to public inspection in respect to my cattle.

As Secretary to a public Society, I look upon you as a public man, which is my excuse for this address. You will oblige me much by informing me the terms of subscription to your Society, with your list of premiums for the present year. And if you wish for information in any thing respecting my cattle, I shall be happy to give it you.

Should any of the Gentlemen wish to procure any of our cattle for the purpose of cross breeding, I shall have pleasure in serving them. Nobody can do it better, as I have expended very large sums in acquiring the best breed both for cattle and sheep.

I am, Sir, your very humble servant,

BENJAMIN SMITH.

Lye, near Alresford, Hants.

## ARTICLE LXI.

*On the Advantages of cultivating Saintfoin as  
a Food for Cows.*

[By an Essex Farmer, an Honorary Member.]

GENTLEMEN,

I AM induced to send you the following remarks on saintfoin, by observing when at Bath, and in passing through the counties of Somerset and Dorset last summer, that there is but little of this valuable grass growing there, although many of the lands seem well adapted to its nature.

Saintfoin is much cultivated in the North-East part of this county, particularly about Saffron-Walden, where the soil is of a chalky kind. The remarks that follow may be depended on, as they are made from my own experience and observation for many years; which have fully convinced me, that of all the foreign grasses, there is none comparable to this.

Saintfoin will always succeed well where the roots run deep; the worst soil of all for it is where  
there

there is a bed of cold wet clay, which the tender fibres cannot penetrate. This plant will make a greater increase of produce, by at least thirty times, than common grass or turf on poor land. Where it meets with chalk, or stone, it will extend its roots through the cracks and chinks, to a very great depth, in search of nourishment. The dryness is of more consequence than the richness of land for faintfoin; although land that is both dry and rich will always produce the largest crops.

It is very commonly sowed broadcast, but it is found to answer best in drills, especially if the land be made fine by repeated ploughing, rolling, and harrowing. Much depends on the depth which this seed is sown. If it be buried more than an inch deep, it will seldom grow; and if left uncovered, it will push out its roots above ground, and these will be killed by the air. March and the beginning of April are the best seasons for sowing it, as the severity of winter, and the drought of summer, are equally unfavourable to the young plants. A bushel of seed sown broadcast, or half that quantity in drills, if good, is sufficient for an acre. The drills should be thirty inches apart to admit of horse-hoeing between them. Much however depends on the goodness  
of

of the seed, which may be best judged of by the following marks :—

The husk being of a bright colour, the kernel plump, of a grey or bluish colour without, and, if cut across, greenish and fresh within; if it be thin and furrowed, and of a yellowish cast, it will seldom grow. When the plants stand single, and have room to spread, they produce the greatest quantity of herbage, and the seed ripens best. But farmers in general, from a mistaken notion of all that appears to be waste ground being unprofitable, plant them so close, that they choke and impoverish each other, and often die in a few years. Single plants run deepest and draw most nourishment; they are also easiest kept free from weeds. A single plant will often produce half a pound of hay when dry. On rich land this plant will yield two good crops in a year, with a moderate share of culture. A good crop must not be expected the first year, but if the plants stand not too thick, they will increase in size the second year prodigiously.

No cattle should be turned on the field the first winter after the corn is off with which it was sown, as their feet would injure the young plants. Sheep

should not come on the following summer, because they would bite off the crown of the plants, and prevent their shooting again. A small quantity of soapers ashes as a top-dressing will be of great service, if laid on the first winter.

If the saintfoin be cut just before it comes into bloom, it is admirable food for horned cattle; and if cut thus early, it will yield a second crop the same season. But if it proves a wet season, it is better to let it stand till its bloom be perfected; for great care must be taken, in making it into hay, that the flowers do not drop off, as cows are very fond of them; and it requires more time than other hay in drying. Saintfoin is so excellent a fodder for horses, that they require no oats while they eat it, although they be worked hard all the time. Sheep will also be fattened with it faster than with any other food.

If the whole season for cutting proves very rainy it is better to let the crop stand for seed, as that will amply repay the loss of the hay; because it will not only fetch a good price, but a peck of it will go as far as a peck and half of oats for horses.

The best time of cutting the seeded saintfoin is, when the greatest part of the seed is well filled, the first blown ripe, and the last blown beginning to open. For want of this care some people have lost most of their seed by letting it stand too ripe. Seeded saintfoin should always be cut in a morning or evening, when the dews render the stalks tender. If cut when the sun shines hot, much of the seed will fall out and be lost.

An acre of very ordinary land, when improved by this grass, will maintain four cows very well from the first of April to the end of November; and afford besides a sufficient store of hay to make the greater part of their food the four months following.

The quantity of milk produced by cows fed by saintfoin, is nearly double to that of any other food. The milk is also much richer, and will yield a larger quantity of cream. The butter will also be better coloured and flavoured than any other. I have known many cows give twelve pints of milk at a meal, and milked twice a day while fed on saintfoin.

If the soil be tolerably good, a field of saintfoin will last from fifteen to twenty years in prime;



but at the end of seven or eight years it will be necessary to lay on a moderate coat of well-rotted dung; or, if the soil be very light and sandy, of marle. By this means the future crops, and the duration of the plants in health and vigour, will be greatly increased and prolonged. Hence it will appear, that for poor land there is nothing equal to this grass in point of advantage to the farmer.

Clover will last only two years in perfection; and often, if the soil be cold and moist, near half the plants will rot, and bald patches be found in every part of the field the second year. Besides, from our frequent rains during the month of September, many crops left for feeding are lost. But from the quantity and excellent quality of this grass, (saintfoin) and its ripening earlier, and continuing in vigour so much longer, much risque and certain expence is avoided, and a large annual profit accrues to the farmer.

I am, Gentlemen,

Your most obedient humble servant,

P. W.

March 21, 1781.

ARTICLE

## ARTICLE LXII.

*On Turnip Husbandry.*

[By a Gentleman in Norfolk.]

S I R,

**I**N cultivating Turnips to advantage, great care should be taken to procure good, bright, nimble, and well-dried feed, and of the best kinds.

The Norfolk farmers generally raise the oval white, the large green-topp'd, and the red or purple-topp'd kinds, which from long experience they have found to be the most profitable.

The roots of the green-topp'd will grow to a large size, and continue good much longer than others. The red or purple topp'd will also grow large, and continue good to the beginning of February; but the roots become hard and stringy sooner than the former.

The green-topp'd growing more above ground, is in more danger of sustaining injury from severe frosts than the red or purple, which are more than half covered by the soil, but it is the softest and

sweetest when grown large, of any kind. I have seen them brought to table a foot in diameter, and equally good as garden turnips.

Turnips delight in a light soil, consisting of sand and loam mixed; for when the soil is rich and heavy, although the crop may be as great in weight, they will be rank, and run to flower earlier in spring.

Turnip-feed, like that of grain, will not do well without frequent changing. Our Norfolk feed is sent to most parts of the kingdom, and even to Ireland, but after two years it degenerates; so that those who wish to have turnips in perfection should procure it fresh every year from Norwich, and they will find their account in so doing. For from its known reputation, many of the London seedsmen sell, under that character, seed raised in the vicinity of the metropolis, which is much inferior in quality.

The only risk in sowing turnips is the danger of their being eaten by the fly, especially in a dry season. This is an evil for which art has not yet found a certain and effectual remedy. Many things have been tried, but none have answered in all cases. The following

following have, however, often proved of service:—A small quantity of foot sown over the land at their first appearance. Branches of elder with the leaves bruised, drawn in a gate over them. Musk mixed with the seed before it is sown. And sulphur burnt under it, after moistening it with water in which tobacco has been steeped.

But showers on the plants as soon as they appear above ground, are the best preservatives. They enfeeble and kill the fly, and hasten the plants into the rough leaf, in which state they are out of danger.

When the plants have got five leaves, they should be hoed, and set out at least six inches apart. A month afterward, or earlier if it be a wet season, a second hoeing should take place, and the plants be left at least fourteen inches distant from each other, especially if intended for feeding cattle; for where the plants are left thicker, they will be proportionably smaller, unless the land is very rich indeed.

Some of our best farmers sow turnips in drills three feet asunder, and at a second hoeing leave them a foot apart in the rows. By this means the  
trouble

trouble and expence of hoeing is much lessened, and the crop of equal weight as when sown in the common method. The intervals may easily be cleared of weeds by the horse-hoe.

Great quantities of turnips are raised with us every year for feeding black cattle, which turn to great advantage.

It is well known, that an acre of land contains 4840 square yards, or 43560 square feet; suppose then that every square foot contains one turnip, and that they weigh only two pounds each on an average, here will be a mass of food excellent in kind of forty-six tons per acre, often worth from four to five guineas, and sometimes more.

Extraordinary crops of barley frequently succeed turnips, especially when fed off the land. In feeding them off, the cattle should not be suffered to run over too much of the ground at once, for in that case they will tread down and spoil twice as many as they eat. We generally confine them by herdles to as much as is sufficient for them in one day. By this mode the crop is eaten clean, the soil is equally trodden, which if light, is of much service, and equally manured by the cattle.

A notion

A notion prevails in many places, that mutton fattened with turnips is thereby rendered rank and ill-tasted; but this is a vulgar error. I know that the best mutton in this county (and few counties have better) is all fed with turnips. It is rank pastures, and marshy lands, that produce rank mutton.

If the land be wet and springy, the best method is to draw and carry off your turnips to some dry pasture; for the treading of the cattle will not only injure the crop, but render the land so stiff, that you must be at an additional expence in ploughing.

Perhaps, Gentlemen, I ought to ask pardon for having troubled you with so long a letter; but however I may have failed in the execution, my design is to excite your attention to a subject of much importance in Agriculture; the exact knowledge of which may tend to introduce improvements in this branch of cultivation, not yet generally practised in the western counties.

I am, Gentlemen, your humble servant,

B——, Feb. 21, 1781.

E. N.



## ARTICLE LXIII.

*On the Culture of Hemp and Flax.*

[To the Secretary of the Society.]

Mr. RACK,

**I** Beg leave to trouble the Gentlemen of the Bath Society with a few remarks on the culture of hemp and flax, as being articles of great national importance, and therefore well worthy their attention.

I have often observed, that the greater part of those rich marshy lands lying to the west of Mendip hills, are as badly managed as any in this county, or perhaps in the kingdom. The farmers, whose property it is, seem content with the produce it affords them without much cultivation or labour; and appear to be utter strangers to its real value, or the profits that would speedily arise from a spirited and judicious mode of management, were it but adopted. Almost any method of cultivation different from the present, would in point of private advantage be infinitely preferable to the present. But were these lands appropriated to hemp and flax, they would prove highly  
advantageous



advantageous both to the land-holders and the public at large.

It is well known, that soils naturally rich and fertile will produce hemp and flax in abundance; and as these are ameliorating crops, they will not, if cut without feeding, impoverish the land. And as the best crops of flax are raised from foreign seed, (which is easily procured cheaper than we can raise it) there is the less occasion for suffering it to feed in this country.

The vast quantities of hemp and flax which have been raised on lands of the same kind in Lincolnshire marshes, and the fens of the Isle of Ely and Huntingdonshire, are a full proof of the truth of my assertion; and a convincing argument of the superior wisdom of the farmers in those places. This will appear in a still stronger light, when we consider, that the other commodities raised on such land sell at higher prices than in this county.

Many hundreds of acres in the above-mentioned places, which for pasturage or grazing were not worth more than twenty or twenty-five shillings per acre, have been readily let at four pounds the first year, three pounds the second, and forty shillings

shillings the third. The reason of this supposed declining value of the land, in proportion to the number of years sown with flax, is, that it is usual with them to seed it for the purpose of making oil, that being the principal cause of the land being thereby impoverished.

It will not appear strange, that such rents should be given for land which produce from fifty to seventy stone per acre, which, when dressed, sell on the average from seven to nine shillings a stone, or twenty-four pounds value per acre.

But the profitable growth of hemp and flax is not confined to rich soils. Experience hath evinced, that they will grow well on poor sandy land, if a little expence be bestowed in manuring it.

Spalding Moor in Lincolnshire is a barren sand, and yet, with proper care and culture, it produces the finest hemp in England, and in large quantities.

In the Isle of Axholme, in the same county, equal quantities are produced; for the culture and management of it is the principal employ of the inhabitants; and according to Leland, was so in the reign of Henry VIII.

In

In Marshland, the soil is a clay or strong warp, thrown up by the river Ouze, and of such a quality, that it cracks with the heat of the sun till a hand may be put into the chinks or openings; yet if once it be covered with the hemp or flax before the heats come on, the ground will never crack or open that summer.

When the land is sandy, they first sow it with barley, and the following spring they manure the stubble with horse or cow-dung, and plough it under. They then sow their hemp or flax, and harrow it in with a light harrow having short teeth. A good crop destroys all the weeds, and makes it a fine fallow for flax in the spring. As soon as the flax is pulled, they prepare the ground for wheat. Lime, marl, and the mud of ponds, is an excellent compost for hemp lands.

The quantity of hemp and flax yearly imported into this kingdom, was, about the year 1763, estimated at about eleven thousand tons;\* and I will venture to assert, that all this quantity might be grown at home without making a scarcity or considerably enhancing the price of any article of our

\* To raise this quantity at home would require about 60,000 acres of land.

present produce, or occasioning any want of hands for carrying on our manufactures. On the contrary, I am induced to believe, it would occasion a considerable increase of people, by inviting numbers from the continent to come and settle amongst us. And as the hemp and flax we import come from countries where the ballance of trade turns in their favour, it would be a great national advantage.

It ought also to be remembered, that the hemp raised in this kingdom is not of so dry and spongy a nature as that we have from Peterburgh. The only objection that our rope-makers urge against using English hemp is, that it takes less tar than the foreign to manufacture it into cordage. But as tar is cheaper than hemp, they use this argument only because there is less profit arises to them from working it. This is therefore a substantial argument in its favour. And this inference may be justly drawn from the objection, viz. that the cordage made of English hemp, when compared with that of the same dimensions worked with foreign, must be stronger in proportion as there is more hemp and less tar in it, provided there be a sufficient quantity to unite the fibres together; hemp being a stronger and more durable substance than tar.

One

One peculiar advantage attending the cultivation of hemp and flax is, that a crop of the former prepares the land for the latter, and therefore a crop of hemp is clear gain to the farmer. That these plants impoverish the soil, is a mere vulgar notion, devoid of all truth. The best historical relations, and the verbal accounts of honest ingenuous planters, concur in declaring it to be a vain prejudice, unsupported by any authority; and that these crops really meliorate and improve the soil.

Therefore as hemp and flax can be raised at home so much to the improvement of our lands, the employment of our poor, and the interest of the nation at large, I am very solicitous that this subject may come seriously under the consideration of your Annual Meeting, and receive all possible encouragement from your public-spirited, and truly laudable Society.

I am, Gentlemen, your humble servant,

A DORSETSHIRE GENTLEMAN.

Dec. 8, 1781.

ARTICLE

## ARTICLE LXIV.

*Directions for destroying Rats in Farm-Yards.*

GENTLEMEN,

Early, Feb. 15, 1782.

**A**S Rats are a species of vermin very prejudicial to the Farmer, I think every method recommended to destroy them merits attention; and therefore send you the following, which, after trying a multitude of other things, I found most successful.

To a quart of oatmeal, I put six drops of rhodium, a grain of musk, and two or three nuts of nux vomica finely powdered,

This mixture I made up into pellets, and laid them in the holes where the rats frequented. This was at first greedily eaten, and did great execution; but these sagacious animals soon discovered their enemy, and swallowed the bait no more.

I then tried the following:—To three parts of oatmeal, I put a fourth of staves-acre powdered, mixed them well, and made into a paste with honey. I laid pieces of this in the holes, and so  
many



many were killed by it, that my house and barns became very disagreeable by the smell of them when dead.

To prevent this inconvenience, I then endeavoured to take them alive. To effect this purpose, I trailed toasted cheese and red herrings from their holes into an empty room, where I placed oatmeal and other sorts of food they are most fond of, and permitted them to eat it without interruption. On finding, from their not being molested, that their numbers increased, I set a large box into this room with its side downward, and the lid being lifted up, was suspended in that position by a string run through, or over a pulley in the ceiling, the end of which was placed within reach, when a sufficient number were eating in the box, in which I placed oatmeal and such other food as they are fond of. At first they entered the box with caution, but in three or four nights they went in boldly, and would eat there like pigs at a trough. It being moonlight, I watched them one evening, and having painted the inside of the box white, I could easily discover when it was full; the fifth night, on pulling the string, I let down the lid upon them, which being loaded with a large stone to prevent their pushing it open, I



secured upwards of sixty at once; and repeating the experiment, in about three weeks I caught near eight hundred of these vermin.

By this method I so effectually cleared my premises, that I have sustained but little damage since.

I am, your humble servant,

M. N.

#### ARTICLE LXV.

#### *On the Management of Seed Barley in a dry Season.*

[Communicated by a Gentleman of Yorkshire.]

**I**T is well known that Barley is less valuable when it does not ripen equally; that Barley which comes up speedily in a dusty soil, must gain a great advantage over feed weeds; and this year barley that shall come a fortnight or three weeks earlier than others to market, will probably draw a higher price.

Therefore, first take out about one-third of the contents of the sacks of Seed Barley or Bear, to  
allow

allow for the swelling of the grain. Lay the sacks with the grain to steep in clean water; let it lie covered with it for at least 24 hours. When the ground is so dry as at present, and no likelihood of rain for ten days, it is better to lie 36 hours. Sow the grain wet from steeping, without any addition of powdered quick-lime, which, though often recommended in print, can only poison the seed, suck up part of its useful moisture, and burn the hands of the sower. The seed will scatter well, as clean water has no tenacity—only the sower must put in a fourth or a third more seed in bulk than usual of dry grain, as the grain is swelled in that proportion: harrow it in as quickly as possible after it is sown; and tho' not necessary, give it the benefit of fresh furrow, if convenient. You may expect it up in a fortnight at farthest.

My steeped barley, sown on the 10th and 11th of April, is now from four to six inches high; and what was sown on Saturday the 19th and Monday the 21st of April, on a ley holm, above a month ploughed, is this day, or in the space of a fortnight, fairly come up; and the head-ridges, especially one that was recently ploughed, though sown on the 25th, is beginning to appear. But the steeped seed running short, my overseer sowed  
about

about a rood on the fresh ploughed head-ridge, with unsteeped barley, where not a plant as yet appears; but, on the contrary, the grain may be found in the soil as dry, hard, and wrinkled on the skin, as when taken from the granary. In this uncommonly dry season, I need not point out other instances of grain much longer sown, not as yet come up. I shall only add, that I have uniformly followed this method for above a dozen years with unvaried success.

WILLIAM COPLAND.

Blackwood, near Dumfries, May 3, 1783.

F I N I S.











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